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MEDICAL WAR MANUAL No. 5

**Authorized by the Secretary of War
and under the Supervision of the Surgeon-General
and the Council of National Defense**

Lessons from the Enemy

HOW GERMANY CARES FOR HER WAR DISABLED

BY

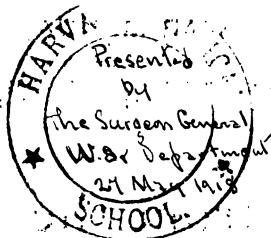
JOHN R. McDILL, M.D., F.A.C.S.

MAJOR, MEDICAL RESERVE CORPS, U. S. ARMY

Illustrated



LEA & FEBIGER
PHILADELPHIA AND NEW YORK
1918



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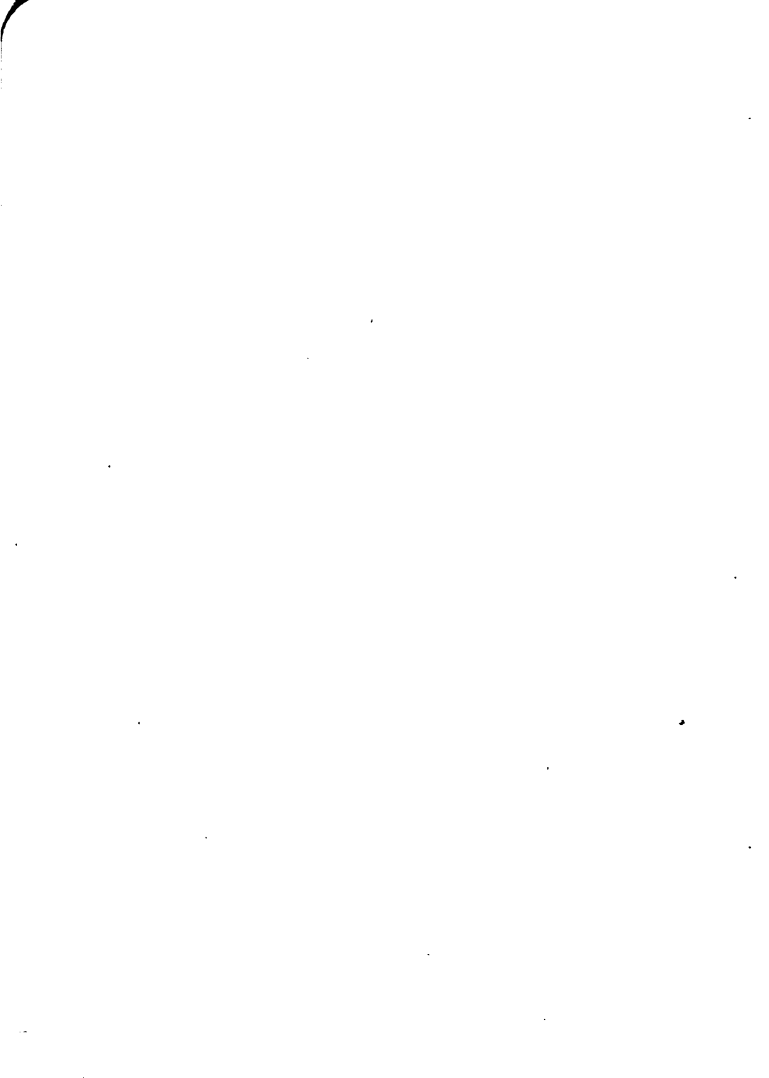
"Fas est et ab hoste doceri"

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1918

GRATEFUL ACKNOWLEDGMENT IS MADE
OF THE
ENCOURAGEMENT AND SUBSTANTIAL ASSISTANCE OF

MAJOR WALTER STERN, Q. M. R. C.

WITHOUT WHOSE AID THE PREPARATION OF THIS MANUAL
WOULD HAVE BEEN IMPOSSIBLE



FOREWORD.

HAVING had opportunities for medical service in this war in England, France, Germany, and Austria, I finally selected Germany as the most interesting field, one in which our army had had no military medical observers, and the one about which the least had been written on the medico-military and volunteer nursing side, the side from which, according to the much-vaunted efficiency of German methods, a great deal might be learned.

An American Physicians' Expeditions Committee of New York was organized to send independent hospital units to the Central Powers. I accepted the directorship of a unit which was financed by a German, Austro-Hungarian Society, of Chicago. Before sailing, at the suggestion of the Surgeon-General, to comply with President Wilson's neutrality proclamation, I resigned my commission as lieutenant in the Medical Reserve Corps with the understanding that I would be recommissioned immediately on my return. We arrived in Germany on June 17, 1916; were assigned first to Coblenz on the Rhine and after one month to Fortress Graudenz in the East. Soon after taking station, mindful of the duty of an officer travelling abroad, I addressed a communication to the War Ministry of Prussia requesting authority to study and inspect their sanitary system to get a clear conception of the medico-military and volunteer coördination and administration in the care of the sick and

wounded, for publication in the United States. This request was promptly approved in the following letter:

(Translation.)

KRIEGSMINISTERIUM,
Medicinal-Abteilung
Nr. 3159-7.16.M.A.

BERLIN W. 66, den 21-7-16.
Leipziger Str. 5.

Give date and number
in answer.

Replying to your esteemed communication of 3-7-16, the Medical Department is gladly willing to assist you in your undertaking and to afford access for you to the various army sanitary organizations. The manuscript of your work must be submitted here. As an introduction to the German sanitary service the Department recommends a study of the following publications:

1. The Sanitary Regulations in War.
2. Niehus, The War Sanitary Equipment in the Field.
3. Altgelt, The Sanitary Service in the Field, 1910.
4. Paalzow, The Army Sanitary Establishment in War, 1915.

Mr. Dr. John R. McDill,
Coblenz-Graudenz.
Festungslazarett.

(Signed) SCHULTZEN.

In the first part of the war the Allies fought against all kinds of odds. The Germans had more of everything in every department and constantly sprang surprises which seemed in a fair way to finish the war in short order; countless things were first practised by the Germans but they were all adopted, improved upon and turned against them by the French and English. Fearful prices were paid for them but good use has been made of them.

It may be news to some that among the amazing things the German army has accomplished, several are, it is claimed, based on American ingenuity. In 1895 Buffalo Bill and his Congress of Rough Riders created a great sensation in all the countries of Europe, including Germany; but when they came to Germany, experts from the general staff of the army were detailed to study and report on the feasibility of adapting some of the new ideas to the business of war and the result was the adoption of the swift methods of making and breaking camp; the use of subcaliber ammunition in target practice to save costs by slipping the smaller-sized barrel into the big one, which they also adapted to field pieces; aiming cannon by sighting over a rifle; making the company appear four times as numerous by as many rapid changes of costume; using caissons in front of guns as shields; and the use of blinds or natural cover in stealing upon an enemy.

The possibility that an account of some observation of the German medico-military and volunteer combined systems of care of the sick and wounded in this war might furnish something of use to our service is the excuse for this publication. The Germans claim that through their system they have been enabled to return 95 per cent. of their wounded to either military duty or to a self-supporting civic or industrial usefulness. The latter is a consummation greatly to be wished by all if, after this war, we care to avoid the total liability and no assets results in this respect for which our nation has been paying billions since 1861. All through this narrative stands out the fact that preparation for war has been going on in Germany for many years, not only by the army but by numerous civic organizations preparing to lend essential assistance when a state of war occurred. Characteristic of this nation-wide and decades-long preparedness was a bit of grim, unconscious German newspaper humor a few months ago

concerning a woman needing a certificate of the birth of her son to comply with army regulations and who wrote to her minister as follows:

"DEAR HERR PASTOR: Please send me a copy of the birth certificate of my son Johann who was born on January 23, 1898, for military purposes.

Respectfully,

FRAU SCHMIDT."

While the anti-American sentiment in Germany has been increasing ever since the beginning of the war and is shared in by every man, woman and child, nevertheless the professional relations of the American relief workers and the German medical men, who have always been our honored co-workers in science, were very fine indeed and left nothing to be desired. At the same time personal relations could not avoid at times being strained, because each felt that the other was misguided; the feeling seemed to be not one of bitterness but a profound sadness that a breach had come between us; but so far at least even this most horrible war has not been able to destroy the international prestige of medical science.

On the voyage to Europe now the very sea and air are ominous, and when one first lands in the world-war zone, in whatever embattled country, one is chilled by the fact that practically all the men are in uniform, that troops are constantly going to or coming from the front bedecked with flowers and played in and out from garrison or from troop-train by crashing martial music, and that the net result is other trains with large red crosses on sides and tops returning from the front full of torn and mangled men, reduced to the helplessness of children by their cruel suffering, and above all, as a by-product, the great number of fatherless children and of widows of those missing or buried on the "field of honor."

Every military unit at the German front has a complete corresponding reserve organization (*Ersatz*) in a garrison in the homeland or back of the lines from which every man that falls is replaced by another fully educated and equipped soldier. One regiment of 2000 men in which an acquaintance served came out of a two-days' action with only 81 men left, but in a few hours after ascertaining the losses, 1900 browned and hardened men with guns and uniforms covered with flowers, each carrying his 75 pounds of equipment in perfect order and every button shining, was marching with long, quick, military stride behind the substitute brass band from some home garrison to entrain and replace the fallen regiment at the front where each tries to kill a man he never saw instead of trying to be his friend, as he probably would if the choice were his, for the German people are full of sentiment, intensely devoted to home and family and if free would never engage in wars. Alongside often walk the now dry-eyed, pale wives with the little ones toddling along to get a last look at the husband or father. When the music pauses these men sing—and they can sing—great diapasons of patriotic but always mournful melody that in time becomes very hard to bear. It wakens one in the night at all hours and in all weathers; first a faint, dream-like music that gradually swells to thundering proportions as the rhythmical crashing of hundreds of hob-nailed boots smite the cobblestones of the streets under one's windows, to fade away as they pass on into the dark unknown. Or one may hear the sullen rumbling of long trains of artillery and the patient tread of their horses, and so it goes on day and night, year in and year out and now the spectators wince with the pain of it.

The air is also vibrant with war. A reserve flying station near us, of 3000 men and 100 machines, driven by dashing young fellows all under twenty-five years of age, are up in the sky at five o'clock every morning and the whirring of their propellers constantly dins into one's ears the dreadful

business of war. They fall occasionally before their chance comes to fall on the battlefield and the pity of it all is seen in the hospital or the morgue. Occasionally a huge Zeppelin returning from a raid will fly low and slow over the city, under two of its five propellers, and maneuver to show the people how flexible and manageable are their warships of the air.

But this is not all. When the reserve men go out as fully educated and trained soldiers, to fill the places of the fallen, men and boys from the fields and shops in their working clothes, each carrying a paper box in which to discard his citizen's effects, shamble in in droves, under the lead of a trim sergeant and disappear behind the garrison's gates to emerge in a few weeks as well set up, alert, fighting men, to await their call to the front to replace their fallen comrades who have gone before. Every boy of seventeen and every man up to forty-five, who can perform any kind of military service is now in uniform, and to meet the losses there is only the annual crop of seventeen-year-old boys, said to be about 400,000 in number. There must be about fifteen million men in the German army, all veterans, two million of them athletes, and of these nearly two-thirds are fighting. As one passes through the country one sees military barracks everywhere and that the burden of tilling the fields falls on the old, the women, the children and the prisoners of war. Almost everything seems to prove that the devil is loose in the world.

In the cities and towns the women, old and young, fill the places of the men and fill them so well that in Germany women will probably never again be entirely relegated to "kitchen, church and children." The women of Europe have inured themselves to a ten-hour day of labor in addition to their other duties and are carrying on the general work of their nations, the care of the wounded and their families in a most wonderfully efficient manner. Every

member of every family over fifteen years old is giving the country nearly full time in some capacity and every wounded man in Germany, even with arms and legs gone, is reëducated to assume his old trade or is trained to some other and income-producing occupation. The orthopedic institutes of Germany are working wonders in making men over again mentally and physically. A graduate of one of these institutions which often has twenty different workshops, representing as many different trades, goes out able to earn his living; what is more, his will-power and courage are also developed until he feels himself a useful and necessary member of society. No one is allowed to lie down under his burden and lose hope. The psychological results achieved are as striking as the physical and industrial capacities developed.

With 30,000,000 men in Europe withdrawn from industry and fighting, the destruction of life and property and human happiness will exceed that caused by the great epidemics of plagues during the middle ages, even though smallpox alone carried off 60,000,000 people in Europe in the sixteenth century. Medical science has abolished these scourges of mankind but the sickness that now afflicts the world—and it is a real sickness—seems beyond control, because even if its cause is known, its remedy may be far off. The common people of Germany at least, although still physically fit, are suffering from a hopeless malady, "*Friedenssehnsucht*," or longing for peace, but as time passes and their rulers demand more and yet more sacrifices and every hope is dashed as soon as it is born, their condition is so desperate that they are benumbed and are finding out that it is not so hard to die after one gets used to it. Everybody's life has been ruined; but, convinced by their leaders that their very existence is at stake, which is of course not true, these poor people will, unless something unexpected happens, fight blindly on until they have been destroyed on the battlefields in this, the

final struggle of reason against force which has been preparing since the beginning of time.

The things that concern the medical profession and the whole world most deeply, as a result of this war, are the loss of medical men, the failure to keep up the supply by allowing medical schools to close, and the coming shortage of modernly trained doctors after the war to help restore its ravages.

Each sick man needs a well person to care for him. Russia has millions of war victims most of whom lack all but the most rudimentary treatment. Great Britain's need in this respect is only less than that of France and Russia. Austria-Hungary and the Balkan countries, the dead lands of Europe, are even worse off than France, and after the war will appeal to us for medical aid in terms which we cannot resist, if we are prepared, as we should be, to supply that aid.

Our own need of trained medical officers, in the organization of a great national army, in the advancement of national health standards made compulsory by the war with its revelations of the physical unfitness of our young men and in the keen competition for world commerce to follow the war, is as yet only dimly realized by the American people.

This world crisis lays upon the American medical men, and upon the American war administration, a gigantic duty which is also a wonderful opportunity to confer world-wide benefits which will go far toward healing the bitterness of war and toward achieving gains which will continue and increase for generations after world peace shall have been restored.

It is imperative that the American war administration and the American medical profession shall as quickly as possible inaugurate a nation-wide movement to impress the American people with the urgency and the vital importance of this need, to formulate working programs for meeting it, and to procure the legislation and the funds with which to execute these programs.

This obligation is no less important than that which we have assumed to equip our Allies and ourselves with fighting men, with food and with war munitions. The five fingers of the fist that will win the war can be named—men, money, munitions, food and, last but not least, health. It should be, and for the safety of ourselves and our Allies must be, dealt with in the same spirit and upon the same scale as that which has been adopted in dealing with these other vital needs of the war and the post-war period.

We can fulfil this obligation only by increasing and strengthening the country's centers of medical, surgical and sanitary education. The medical profession must take the initiative with, however, full recognition of the magnitude of the undertaking and its more than national importance.

In acknowledging the kindly help of the many who aided me in obtaining the data on which to base this account, besides the names that appear in the text, I wish to mention those of Excellenz von Schjerning, Generalärzte Paalzow and Koerting; Oberstabärzte Niehus and Henning; Professors Kimmle, His, Grober, Kahl, Schwiening, Keller, Garre, Hofstätter and Karl; Drs. Radike and Wm. Mueller and Geheimrat Heynacher.

The chapter on Orthopedic Hospitals, Hospital Schools and Workshops is based on personal observations and reports of these institutions in Berlin, Coblenz and Danzig and others in West Prussia and on the reports of the hospitals at Mannheim and those of the province of Brandenburg at Gorden.

J. R. M.

1917.

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LESSONS FROM THE ENEMY.

THE GERMAN MEDICO-MILITARY ORGANIZATION IN WAR. (SEE FRONTISPIECE.)

IN order to better understand the medico-military department's relation to the combatant forces one must know something of the average strength of standardized units which it serves. The average German battalion now has 1000 men, is composed of four companies of 250 men each and each company of four platoons; the officers are one lieutenant-colonel, four captains and one lieutenant to each platoon. Two or more battalions form a regiment, about nine regiments, a division, which is a complete administrative and tactical unit; two or more divisions make up an army corps and several corps an army.

The German army has an interesting and enormously valuable fatigue organization called the "Armierungs Battalion," which solves the vexed question of the disposition of certain men disqualified from the full duties of the soldier. These battalions are composed of men with defects like errors of vision, deafness, loss of a portion of the hand or foot, suspected malingerers, hernias or other curable surgical conditions refusing operation and all others who for any reason seem to be or are disqualified from full duty of soldiers of the line. Each man is given all the manual labor he is capable of and this battalion accomplishes nearly all of the trench work and other labor of the army. A surprisingly large number of these men improve so much under the steady grind that they are restored to the fighting forces.

THE RANK AND PAY OF OFFICERS.—The rank and pay of officers in the German army is as follows:

Commanding General,	marks per year	13,980	plus 18,000 in war.
Lieutenant-General,	" "	13,554	" 4,500 "
Major-General,	" "	10,260	" 2,910 "
Colonel,	" "	8,772	" 1,800 "
Lieutenant-Colonel,	" "	6,552	" 1,500 "
Major,	" "	6,552	" 1,500 "
Captain,	" "	3,400	1 to 4 years.
Captain,	" "	4,600	5 to 8 years.
Captain,	" "	5,100	9 years on.
1st and 2d Lieutenants,	" "	1,500	1 to 3 years.
1st and 2d Lieutenants,	" "	1,700	4 to 6 years.
1st and 2d Lieutenants,	" "	1,900	7 to 9 years.
1st and 2d Lieutenants,	" "	2,100	10 to 12 years.
1st and 2d Lieutenants,	" "	2,400	13 years on.

Rank of medical officers in the German army:

Unterärzt (non-commissioned),	marks per year	1,700	1 to 3 years.
Assistentärzt (Second Lieutenant),	" "	2,100	4 to 6 years.
Oberärzt (First Lieutenant),	" "	2,400	6 years on.
Stabsärzt (Captain).			
Oberstabsärzt (Major).			
Generaloberärzt (Lieutenant-Colonel).			
Generalärzt (Colonel).			
Obergeneralärzt (Major-General).			

When the war broke out all officers, for a time, received double pay. Later a regular war allowance in addition to peace pay was authorized for service at the front; officers serving at home now receive only peace pay.

All officers are accorded many privileges and conveniences which contribute to comfort and economy. An officer's society or exchange supplies at cost everything that an officer or his family needs. Service decorations, according to degree, exempt the wearer from taxes, and others carry with them an annuity up to 30,000 marks a year which goes with the "Pour le Merite" distinction. Officers' rates are obtainable in many commercial houses, and all places of amusement reduce the costs to both officers and students.

Lieutenants, on entering the service, are made a cash equipment allowance the same as in the English army.

SANITARY PERSONNEL.—The enlisted sanitary personnel is 126,000 strong and is graded as follows: (1) Militärkrankenhelfer or orderly; (2) Sanitätssoldat or male nurse; (3) Sanitätsunteroffizier (Gefreiter) or clerk, etc.; (4) vice Feldwebel or sergeant and (5) Feldwebel or sergeant of the first class.

The volunteer Red Cross personnel is 179,000, making over a 300,000 total for the sanitary enlisted and volunteer forces.

While the details of military operations during their progress should be, and usually are guarded from the public in all countries, it is only their results that are criticized. On the other hand, the medical department of all armies deals with the most intimate personal and even sacred affairs of the soldier, his family and his friends. These get impressions from the returning soldiers, from letters, from nurses, occasionally from the civilian doctors at the front, from the numerous hospital trains, received and inspected along the way by both authorized and unauthorized persons, many of them emotional, so that it always happens that many are ready to criticise and condemn the entire medical department because of some incident that excites their prejudice or sympathy.

Since early in the war exhibitions of methods for the care of the sick and wounded have been held in Berlin and elsewhere to teach the general public in a vivid and impressive manner what is being done for the disabled soldiers from the fighting line back to the homeland through the chain of medico-military and volunteer institutions established for their care. Popular lectures and addresses by prominent men and women are a feature that contribute materially to explaining and supplementing the exhibits. A number of these addresses have been printed and circulated broadcast.

The fundamental basis of the entire care of the sick and wounded in war time is the medical department of the army. Volunteer service ably assists the official care and must be described separately.

The war equipment of the medical department represents the study of its regular officers after many years of field service. It is not enough that the battalion surgeon is familiar with the contents of the infantry medical supply wagon or that the hygienist knows his portable bacteriological laboratory; every regular officer must be familiar with the entire equipment of the department sufficiently to temporarily cover any position in case of need. It is not easy even in peace for a large number of reserve officers to get instruction concerning military duties, the equipment, its use and its changes, as admission to the garrison service schools, only one of which is in each army corps, is limited. Hence, preparatory for this war the Surgeon-General directed the publication of a complete and richly illustrated description of the medical department and its equipment from January 1, 1913; a book of over 500 pages. The education of medical officers of the regular service is in and under the great "Kaiser Wilhelm Akademie" in Berlin founded for this special purpose.

In peace the medical department of the Ministry of War has charge of the entire sanitary system of the army with a Surgeon-General, "Generalstabsarzt der Armee," on the general staff at its head. He has under him a number of inspectors also of general rank, one grade below the Surgeon-General, each of whom superintends the sanitary service in a number of army corps. In each army corps, corresponding usually to the extent of a province, there is a medical board having a corps physician at its head who, supported by subordinate division surgeons, directs the medical and surgical service among the troops and in the military hospitals.

With the order to mobilize entirely new problems are faced; martial law is established and arrangements must be made for sanitary service (1) in the actual field of operation, (2) in the line of communications (Etappen District), the territory connecting the front with the home, and (3) in the home country.

The duties under (1) and (2) are in the hands of the Surgeon-General now known as the chief field surgeon, "Feldsanitätschef," who is stationed at imperial headquarters; the duties under (3), in fact the direction of the entire sanitary service at home, including the reserve garrison troops, is in the hands of the Medical Department of the Ministry of War at the Capital, the chief surgeon of which is a general officer and the representative of the field chief.

The chief field surgeon supervises the entire sanitary service in the field, the military-medical personnel, the sanitary divisions, hospital trains, the service in the lines of communication, the distribution of the sick and wounded, and of the volunteer nursing forces assigned to his department. He is always in close connection with his representative at the medical department of the Ministry of War in Berlin, which is also under his jurisdiction in most matters.

The rest of the medical personnel in the army may be briefly mentioned. In each army composed of several corps, there is an army surgeon, an "Armeeärzt," of general rank and also next in rank to the field chief; in each corps there is a corps surgeon, also of general rank. On his staff there is a hygienist and a consulting surgeon. The duty of the hygienist, usually a civilian distinguished in health matters, who is given general rank, is to prevent epidemics rather than to combat them. The consulting surgeon is also usually a man eminent in civil life and is honored accordingly by receiving the rank of a general officer. The consulting surgeon may not only be consulted, but he may also freely offer his active assistance and advice in the hospitals, on the battlefield or in the communication lines (*Etappe*).^{*} He is subject to many important special details. There is no lack of good surgeons in the field divisions, due to foresight, in time of peace, of the military authorities in command-

^{*} Wherever the French word *Etappen*, *Etappe*, or its abbreviation "Etap." occurs, it refers to the zone of the line of communications.

eering young surgeons who have been for a number of years in service in large hospitals and surgical clinics.

That the officers of the medical corps of the German army are able to carry out the duties for which they are held responsible, without interference or unnecessary delay and in a really efficient manner, is due to the fact that they are equal in rank and authority with line officers and that the department is as independent as practicable of other corps. The use of medical officers in administrative positions other than as chiefs of services and their executive officers has never been practised.

Each field hospital (*Feldlazarett*) and each war hospital (*Kriegslazarett*) has its competent clinical surgeon. In difficult cases a consultation with specialists is often resorted to. In war from the day of mobilization all military hospitals are called lazarettts in Germany; in peace times they are called hospitals.

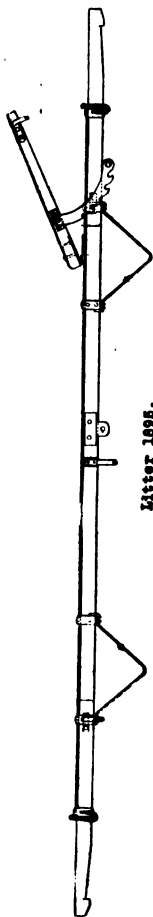
Each division, regiment and battalion has its own chief surgeon, assistant surgeons and sanitary personnel. Each troop has its own sanitary outfit, each battalion of infantry its own sanitary supply wagon. Each company, battery and squadron has a non-commissioned sanitary officer and four assistant men nurses or orderlies.

Where troops are on the march, a "*Krankensammel-punkt*," a gathering place for the sick, is selected, before retiring at night; to this place the sick who are to be left behind are marched or transported. When longer halts are made, local field hospitals, "*Ortslazarette*," are arranged as need requires, and according to the principles obtaining in peace.

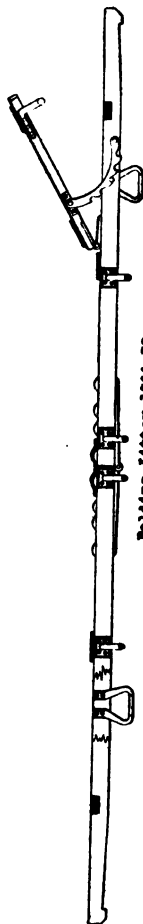
Articles supplied to all men in the field, both officers and soldiers, are, two first-aid packages, sewed in the front corners of the blouse; woollen abdominal bands which are worn by each man of the infantry, sharpshooters, foot artillery, pioneers, field baker columns, ambulance companies and field hospitals, and earmuffs, pulsewarmers and head protectors (helmets) when mobilization occurs between October 1 and the end of March. During the warmer seasons only

about twenty abdominal bands are issued to each company. For the sick in field hospitals and line of communications the supply depots and hospital trains provide abdominal bands at all times. According to paragraph 6 of the Royal Prussian Field-lazarett regulations of September 16, 1787, each soldier at the outbreak of war, received $\frac{1}{4}$ pound of charpie and two bandages of a certain length and width from the regimental surgeon; the cost of the necessary materials was provided from the mobilization funds.

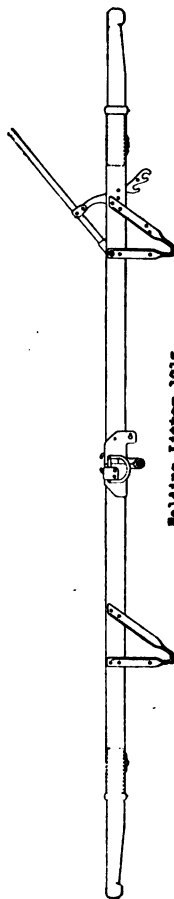
TRENCH HOSPITALS.—The farthest front sanitary arrangements of trench warfare are those called "Ortskrankenstuben," local dispensaries, and "Ortslazarette," local hospitals (Figs. 5, 6, 7 and 8); the first are usually above ground and the others, six to eight meters under the earth's surface. The dispensaries are erected adjacent to the trenches, whatever the terrain may be, by the slightly wounded, nurses and workmen detailed from the regiment. The building material is usually obtained from ruined buildings and the tools often must be improvised. The water-supply section improvises the necessary plumbing, finding pipes for hot and cold water, etc., in wrecked factories; bath tubs and showers are supplied from the lines of communication; the pump is often operated by a horse gear; the company bathing furnishing the horse. Hundreds of men can bathe daily. The principal drawback to this surface establishment is that a well-aimed shell will put it out of commission. The underground hospital can be very completely equipped and serves all the purposes required of this type of lazarett. These also, however, are destroyed by intensive high-explosive artillery fire, once the enemy gets the range. Smaller underground emergency dressing stations and resting places for the wounded are provided, to which the patients are transported along trenches two meters deep, provided at intervals with niches to rest in and adits for protection from fire. Every company has four men detailed as litter bearers under a sanitary sergeant. During an



Litter 1895.
FIG. 1



Folding Litter 1866-78.
FIG. 2



Folding Litter 1913.

FIG. 3



Emergency Litter.

FIG. 4

A very useful closed litter for garrison use for transporting patients with their bedding in inclement weather is one provided with a rain-proof hood, which folds back at the head like that of a child's carriage, and a body cover opening to the side. On a two-wheeled cart one attendant can take a patient or a body from one hospital to another or to or from railway stations, etc.

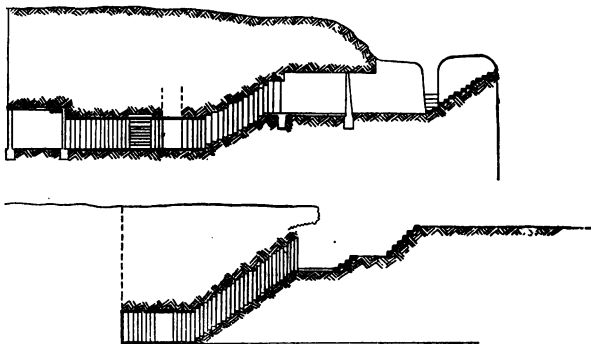


FIG. 5.—Vertical section of regimental underground hospital at front line, showing entrance and exit. (Henning.) Personal communication.

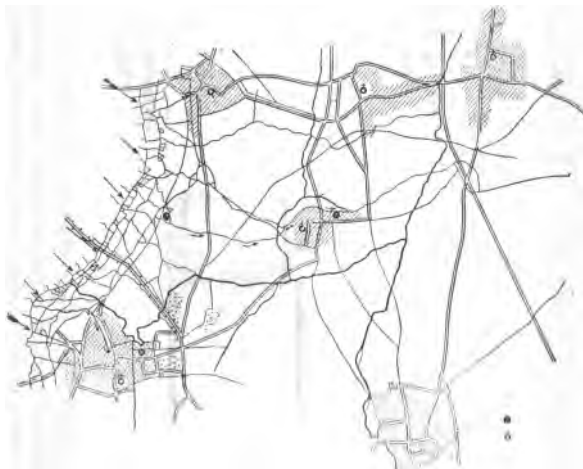


FIG. 6.—Sketch of a front-line sanitary underground hospital and sanitary company organization in France, 1916. (Henning.) Personal communication.

engagement the battalion surgeon is stationed near the battalion commander, when his services are not needed with the injured. In these units an oculist is available from the regiment to prescribe glasses which are prepared by an optician from the division. A dental assistant does neces-

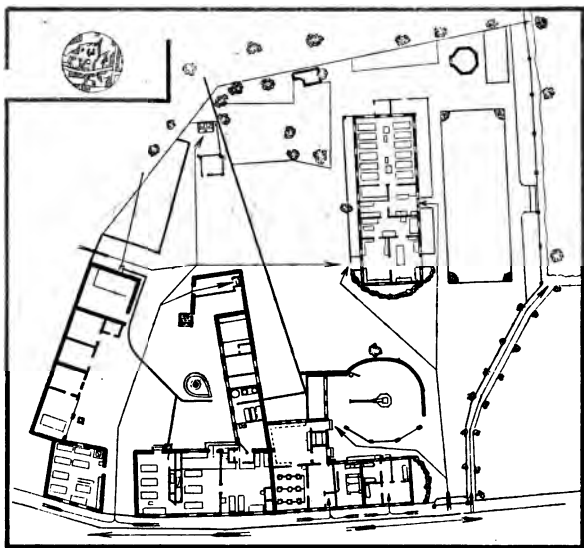


FIG. 7.—Ground plan of a front-line regimental trench hospital in 1916 (Ortskrankenstube) "somewhere in France" underground. (Henning.) Personal communication.

sary dental work and gives first aid in cases of hemorrhage from the jaws. When such a station is long occupied, kitchens, gardens and general farming with raising of chickens, pigs and cattle for the sick is sometimes feasible.

The doctors and sanitary soldiers attached to a troop or battalion in the trenches engaging the enemy must crawl

from cover to cover to bring first aid to the wounded and to carry them out. When there is no local or underground arrangements they receive further care at the "troop bandaging stations," usually one for each regiment, which are in the immediate rear of the firing line and often in the danger area. It frequently happens that after a skirmish or battle it is impossible for the limited troop medical staff to care for the great numbers of wounded in a short time.

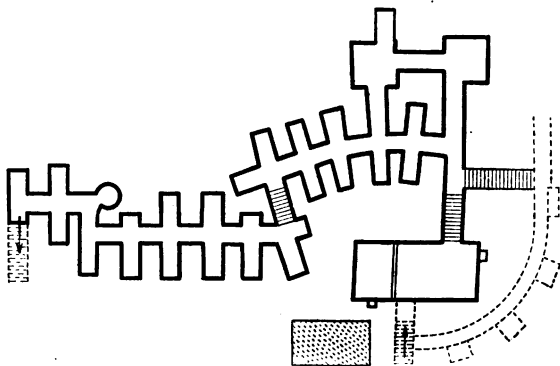


FIG. 8.—Sketch of a regimental underground trench hospital in France in 1916, near Liancourt. (Henning.) Personal communication.

For this reason special sanitary divisions are formed for the duration of the war which do not exist in time of peace. However, these divisions have been drilled and equipped before the outbreak of war so that they are ready at any time to take up their duties, fully equipped, in a systematic manner.

The most important field sanitary divisions are the sanitary companies and the field hospitals. There are three sanitary companies of 250 men each in each army corps,

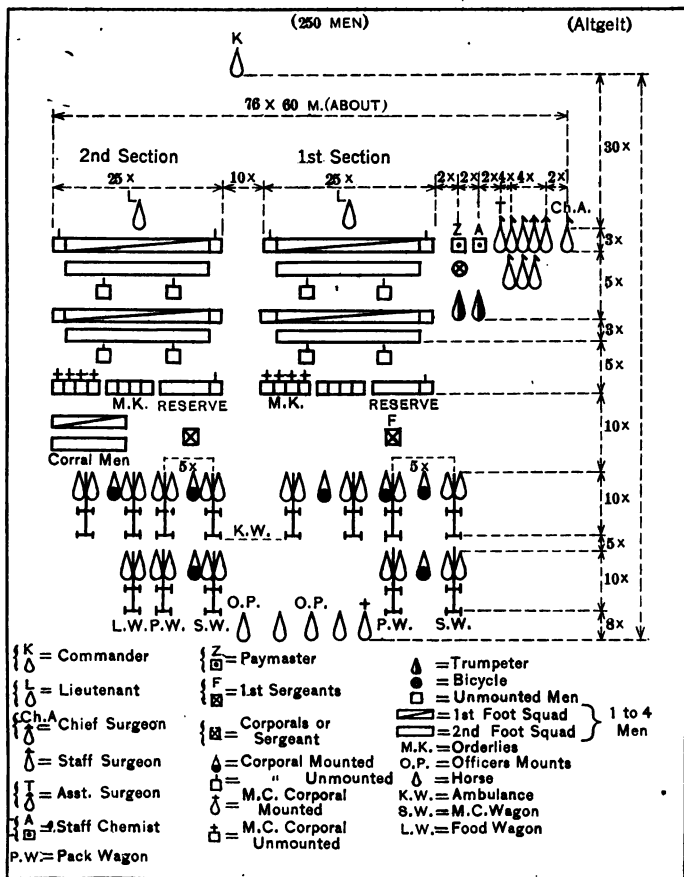


FIG. 9.—Formation of a sanitary company.

entirely commanded by medical officers (Figs. 9 and 10). Their duties are to search for the wounded after a battle,

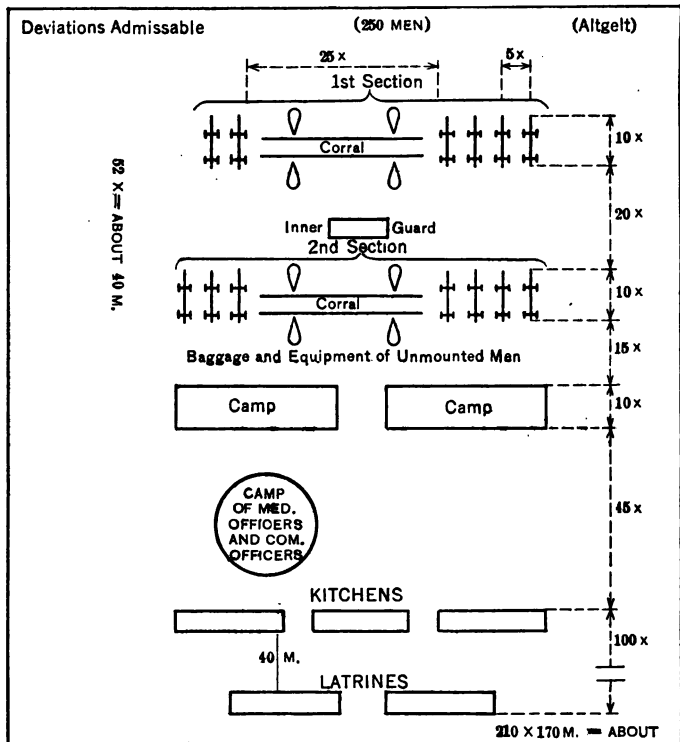


FIG. 10.—Bivouac of a sanitary company.

to put on the preliminary dressings, if necessary, at any rate to care for them to such an extent that they can be

transported to the rear. The orderlies carry them on litters to the first-aid stations or to the halting places of the ambulances. From here they are conveyed in ambulances or automobiles to the main bandaging station still farther to the rear. When a trench line has been stationary any length of time, narrow-gauge supply tracks are laid from the Etappe; small closed cars for wounded are then prepared; they hold four lying cases and are heated in winter. At these main stations surgeons and the personnel of the sanitary company receive them, give them a revision of the first aid, perform the most emergent operations, place broken bones in splints or plaster casts, separate those that are transportable, non-transportable and those who are able to march. Here they also receive nourishment from the field kitchens. After receiving this medical aid and other attention they are transported by the sanitary companies to the field hospitals. Those who are able to march receive the all white tag, those who are transportable the white tag with one red margin, and those who cannot be transported, a card with two red margins; these red margins are perforated and detachable from the white center. (See Figs. 11 and 12.)

SANITARY COMPANY.—Divided according to its duties, a sanitary company of 250 men consists of (1) the medico-military personnel, men orderlies or stretcher bearers under

EXPLANATION OF FIGS. 11 AND 12, PAGES 32 AND 33.

FIGS. 11 and 12.—The tag for sick and wounded is made from white, heavy bond paper of two thicknesses with a coarse cheesecloth between. It is about 9 by 13 centimeters and has on each side an easily separable red margin; the presence or absence of one or both margins indicates what disposition is to be made of the case. Twenty-five tags in a block are put in an envelope, on the inside of which is printed: (1) Tags are to be filled out by surgeons only. (2) Tags are to be attached to the button-hole of blouse, overcoat or shirt. Each block is provided with a graphite pencil. The cost of one block with pencil is about 20 cents.

(Front side)

	○	
	<p>Not transportable; two red margins.</p> <p>Transportable; one red margin.</p> <p>Able to march; no red margin.</p>	
	<p>Name.</p> <p>(Rank and Organization)</p> <p>Injury.</p> <p>(Disease)</p> <p>Treatment given.</p> <p>(Nature of and time)</p> <p>Elastic constriction.</p> <p>(Time applied)</p> <p>Drugs administered.</p> <p>(Time, Dosage)</p>	
Red		Red

(Actual size)



Next dressing, etc., necessary;
(Time, Nature)

Attention especially called;

Red

Red

Name of Surgeon.
(Rank and Organization)

(Actual size)

FIG. 12

the command of medical officers; (2) sanitary personnel, sanitary non-commissioned officers and men nurses; (3) train personnel. Besides the ambulances each with 9 men, each division has (1) a wagon which contains the surgical instruments, utensils, bandages and medicines; (2) a provision wagon with food and utensils to supply the needs of hungry and thirsty; (3) a luggage van with woolen blankets, utensils for the sick and a large tent used when necessary at a temporary bandaging place. A reserve sanitary company is assigned to each reserve division.

THE FIELD KITCHEN ON WHEELS (Figs. 13 and 14).—The company field kitchen on wheels was originated in 1831 with the idea of preparing food on the march and having it ready to serve the troops during halts and during battle. Prize competitions resulted in the present type, which uses glycerin instead of a water bath, being adopted in 1908. The front section carries the supplies and the rear section the cooking apparatus, utensils and fuel. Equipped for war it weighs about 1165 kilograms, or about 2500 pounds. In addition to this is the weight of the food kettle, the coffee container, and the driver. It is flexible enough to travel in almost any kind of country but in case of need the two parts are separated and, with extra shafts, are driven independently with one or two horses. The cook kettle holds 200 liters, the coffee tank 70 liters. The big kettle has two walls, the outer, copper, the inner, nickel and the space between is filled with glycerin. The coffee tank is made from pure nickel. Coffee tank and cook kettle have a common, lay-down stovepipe. The glycerin layer prevents burning of the food kettle while cooking and keeps it hot afterward. The coffee tank is also protected with glycerin. The glycerin expands during cooking and when it spurts from the gauge, it is a sign that the fire is too hot. After daily use for four or five months the glycerin should be renewed; a supply is carried for this purpose; only highly concentrated, at least 87 per cent.



glycerin, free from mineral acids and salts, may be used. Any kind of fuel can be burned; for two meals a day, 37 kg.



FIG. 14.—Field kitchen. Rear side of back section.

of wood are required; of coal, 85 kg. will last three days. Cooked food remaining a long time unused in the kettle

must be thoroughly heated about every twelve hours; it will be found to be palatable, however, thirty-six hours afterward. After the food and coffee have been issued,

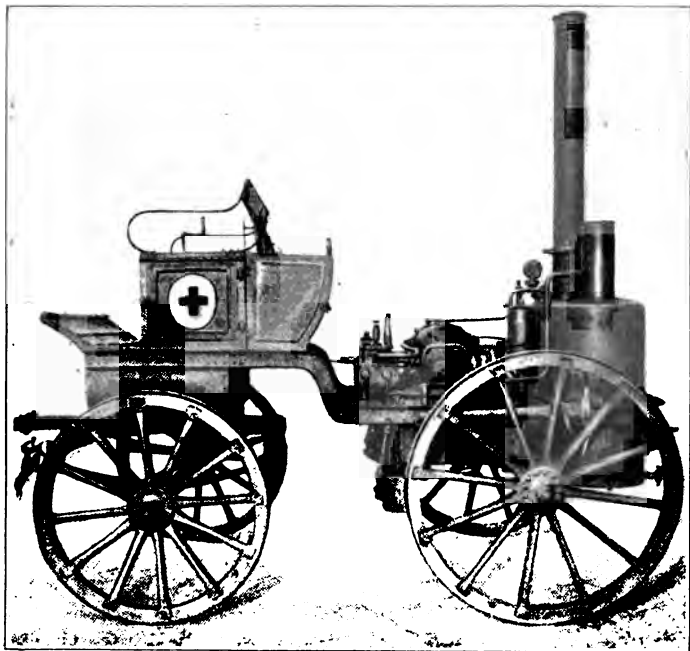


FIG. 15.—Portable drinking-water apparatus; left side. (Niehus.)

everything is thoroughly cleaned with brushes, cloths and soda; no sand, etc., is allowed for this purpose. After cleaning, the kettles are left open for ventilation until the odors

of food have disappeared. When the chimney is lying down the outfit resembles a gun carriage and gives it its nickname of "Goulash Cannon."

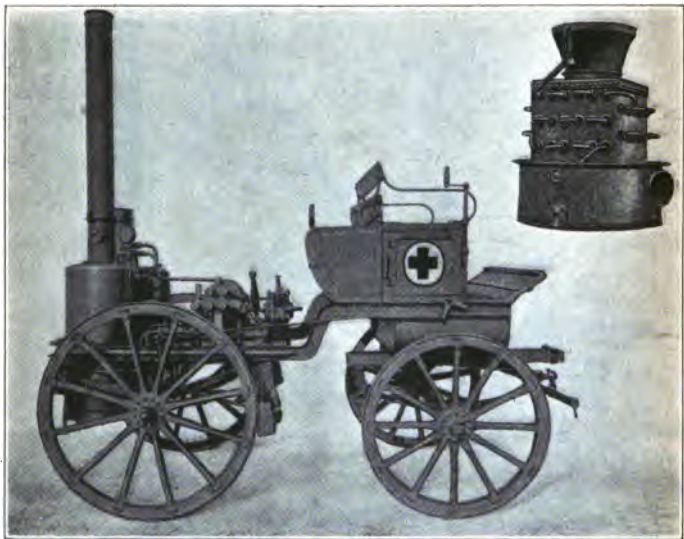


FIG. 16.—Portable drinking-water apparatus, right side, and firebox. (Niehus.)

FIELD DRINKING-WATER APPARATUS ON WHEELS (Figs. 15 and 16).—The medical department of the War Ministry began experiments in 1899 with a portable field apparatus for drinking-water, one which would furnish clear, potable, germ-free water in sufficient amount for a battalion at war strength, at the rate of 500 liters an hour at a temperature of not over five degrees above that of the raw water used. Im-

provements were suggested nearly every year at the annual maneuvers until 1910, when the present machine was evolved.

The weight of the complete apparatus is 1350 kilograms or about 3000 pounds; it has a flexibility of the shaft of 18 degrees upward and 16 degrees downward and it can turn on its own axis right or left. The water is first cleaned by



FIG. 17.—Sixteen-liter drinking-water container. (Niehus.)

two secondary filters, one coarse and one fine, made germ-free by boiling to 110° C., cooled off in the cooler and again filtered through the main filter. The water is pumped from the river, pond, etc., through a basket filter into the apparatus, first by a hand pump until steam is generated for the steam pump which furnishes 750 liters an hour under a

steam pressure of 0.2 of an atmosphere. Provision is made against freezing in cold weather. Either wood or coal can be used as fuel. The boiled water is thoroughly aerated by cotton-filtered air to make it palatable. The final receptacle contains 50 liters of pure water. After using, all of the piping and hollow parts are sterilized by steam for ten minutes.



FIG. 18.—Cylindrical hand lanterns.

The water is delivered to the troops in a sealed tank (see Fig. 17) provided with a faucet. The water tanks consist of the container, a mantel and a felt layer between to hold the temperature. The container holds 16 liters, is pressed from one piece of steel and nickelled and the mantel is of corrugated iron. The cover has the faucet and is clamped on by a winged set-screw making the receptacle water-tight.

FIELD ILLUMINATION.—The search for and preliminary care of the wounded has mostly been undertaken after dark, as the



FIG. 19.—Tent lamp, 1909



FIG. 20.—Patrol lamp, 1909.



FIG. 21.—Siemens-Halske trench light with metal cover of pad open, allowing writing with just enough light for paper and not visible a few feet away. A button makes a flash, a sliding catch a steady light.



FIG. 22.—The Siemens-Halske, 1916, officers' field light with memorandum pad and pencil, closed; actual size; weight 12 ounces.



FIG. 23.—Siemens-Halske, 1916, trench light with hood half-raised, preventing upward direction of light. Powerful light for reading, etc. The buttonholed straps top and bottom fasten it securely to the person.

enemy fires as soon as anything is seen to move. For this reason the illumination problem became an important one. The orderlies and all temporary or first-aid troop bandaging places are equipped with acetylene lanterns that throw the light downward only.

The experiment of using dogs in the search for wounded has been tried with much enthusiasm. Doubtless many a soldier owes his life to the sagacity of these animals. The animals used are a shepherd breed of dog, short-haired, strong, active and very intelligent; some show the strain of the Russian wolf.

FIELD HOSPITALS.—A second and very important division is that of the field hospital, of which each army corps possesses twelve or as large a number as needed. Each field hospital consists of nine wagons which are escorted by physicians, surgeons, enlisted sanitary soldiers, orderlies mounted and on foot, on bicycles or on the wagons. These wagons contain everything necessary to equip a hospital for 400 patients; they consist of: 1 ambulance; 2 wagons for surgical instruments, drugs and dressings in large amounts; 4 wagons for utensils; 1 van containing bed linens, clothing and woolen blankets, and 1 van containing cooking and nursing utensils; everything is well planned and carefully packed. When such a hospital on wheels must be made ready for the reception of the wounded a village or large farm is selected, since it is impossible to carry field barracks. Whenever possible a building is selected for this purpose, sometimes only a barn. The only absolutely indispensable requirement is that there be plenty of water in the neighborhood for the sterilization of instruments and for the preparation of tea, coffee, cocoa, soup, etc. The sight that often greets the eyes of the field hospital surgeon upon his arrival with his travelling hospital is one of uninhabited homes with shell-riddled roofs and walls, broken windows, and dead animals lying about. This chaos must be transformed into

orderly, well-organized hospital arrangements. Out of straw and dried leaves in bed sacks, temporary beds on floors are hurriedly made, which the soldiers approve as warm and

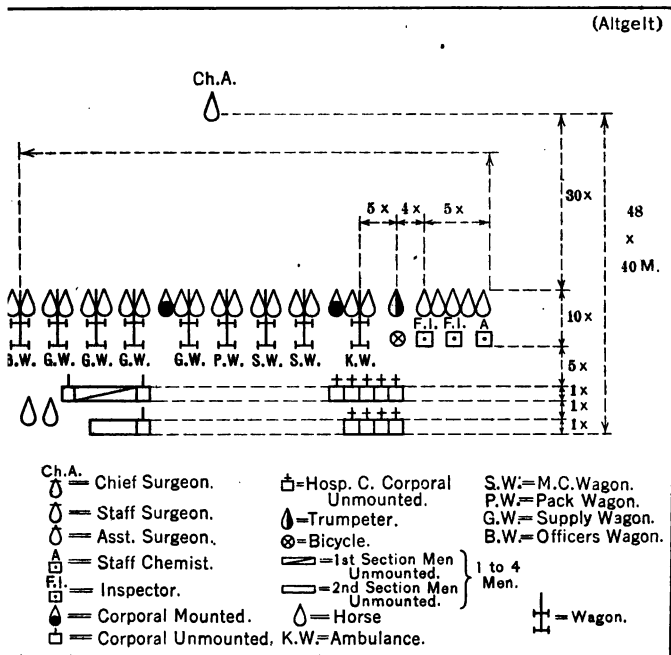


FIG. 24.—Disposition of a field hospital.

comfortable. Then wooden bedsteads are hunted and requisitioned or in lieu thereof lumber for the speedy making of them; a kitchen must be improvised; the lightest room is chosen for an operating and bandaging room. The iron

hospital A will immediately be set up in the village of X; tonight the wounded will be brought in." If a field hospital



FIG. 26.—Hospital tent. Ground area, 14 by 11.5 m.; at the eaves, 10 by 7.5 m.; height to ridge, 4.24 m.; side wall, 2.4 m.; for 16 to 20 beds; on each side 2 partitions making 2 toilets, 1 attendant's room and 1 store room. One non-com. and 8 men can pitch in sixty to eighty minutes and strike in twenty to thirty minutes; loading on wagons takes fifteen minutes; 1 railway car holds about 14 tents.

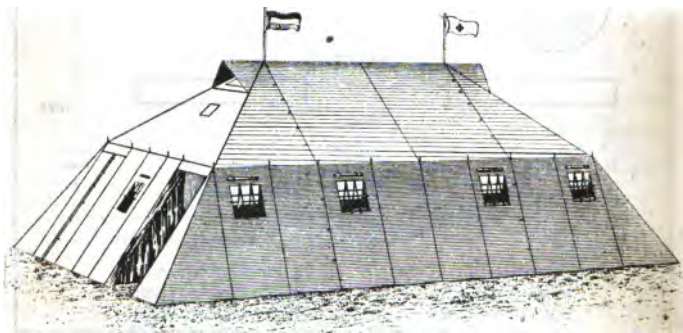


FIG. 27.—Standard hospital tent, 1903.

remains any length of time it gradually becomes more comfortable. With zeal and aptitude the buildings are repaired,

the empty wagons are sent to neighboring villages that were not selected for hospitals and here new supplies are requis-



FIG. 28.—Dressing tent with signalling light. Ground area, 7×9.4 m.; height to ridge, 2.7 m.; to top of side poles, 1.9 m.; of signal, 4.7 m. Pitching and striking takes about ten minutes.

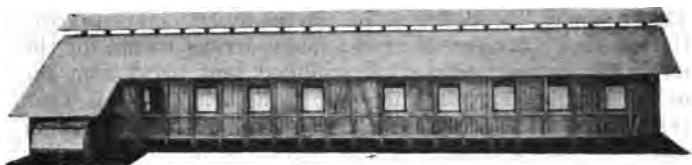


FIG. 29.—Hospital barracks. Permanent; for 30 beds; ground area, 28 by 7 m.; thousands of these are in use.



FIG. 30.—Doecker barracks. Portable, take-down system for 20 beds.

tioned. If the army is advancing the field hospital must join it and move on. The wounded are either sent farther back, if they are transportable, or a substitute personnel for the hospital is sent from the line of communications. Sometimes a new field hospital equipment is furnished, and the personnel of the one in use is replaced by another. Four reserve field hospitals are assigned to each reserve division.

To relieve the field dressing stations from the patients who are well enough to walk, a station for the lightly wounded is established by the "Divisionsarzt," called "Leichtverwundetensammelplatz;" this should lie farther to the rear and represent a connecting link with the Etappen or line of communications; a certain percentage of the slightly wounded is ordered forward to the troop again. The mobile reserve militia (Landwehrtruppen) are furnished medical equipment from the line of communications.

SANITARY SERVICE IN THE LINE OF COMMUNICATIONS.—This is under the direction of the Etappen chief surgeon. He has many duties. He must make arrangements for the reception of large masses of wounded sent back from the field hospitals, he must send relief to the field hospitals when they move on; he must arrange for the transportation of some of the wounded farther back, to home hospitals; he must establish special Etappen hospitals, particularly isolation hospitals. He regulates the duties of the volunteer nurses in this zone; he sends on the sanitary supplies for the advancing troops and sanitary division. For the prevention and care of contagious diseases and the erection of isolation field hospitals he is assisted by a consulting hygienist; for this important service professors of hygiene and other health officers of note are chosen. He is also counselled by hospital directors or inspectors, older and experienced medical officers, one for each corps. He gives to each one of these a certain district and at the time a so-called war-hospital division, consisting of a group of doctors from civil life,

hospital surgeons, dentists, non-commissioned sanitary officers, Red Cross personnel, and enlisted orderlies. They are at the same time responsible for the timely evacuation of the field hospitals. The difference between a field and a war hospital is: a field hospital is a mobile hospital for temporary treatment, which follows the army; a war hospital belongs to the line of communications and has a more permanent character. For instance, when a field hospital must follow an advancing army a staff is sent on by the war hospital division to substitute for it. The latter brings along the sanitary supplies from the sanitary depot stores of the Etappen district. Thus the wounded who are not transportable do not change their quarters, in other words, the field hospital automatically becomes a war hospital and its entire management continues in its original groove; or in some cases they exchange personnel, and the field hospital personnel advances with the new hospital equipment. Under certain circumstances war hospitals are also made available for the immediate reception of wounded.

Each communication-zone sector has a steam laundry, mounted on a motor truck; it is worked by its own electricity which turns the wash drums and steam mangle; it makes its own steam, hot and cold water, and can be set up near any stream or pond. The structure on the motor chassis can be rolled off; sides are then attached and the truck is thus converted into a delivery wagon, which is sent out to gather and return the laundry to and from the different hospitals. In one full day this portable laundry is able to wash, disinfect, dry and iron 2000 kilograms of washing, so that the hospitals in this respect are entirely independent of wind and weather.

In the line of communications where there are usually railroads, large base hospitals are erected. Hospital trains do not run as in peace times; they must wait upon the movements of troops, munitions, war material, and provisions for the

fighting troops. Occasionally the sick and wounded are delayed considerably and sometimes in these Etappen hospitals thousands of patients accumulate who are ready to be sent to the home base hospitals. Since these hospitals are rather permanent, and being so near the railroad, are more easily supplied, they are completely furnished after a short time. They are often located in school-houses, factories or farmhouses. There is never any lack of operating rooms, bath rooms and good kitchens. They butcher and make fresh sausages and other meat products.

Besides the regular acute hospitals, there are establishments for the less seriously ill, and for convalescents, serving those patients who expect to be restored to duty soon. The latter are erected as needed. In a large Belgian North Sea resort of world renown, a convalescent home for typhoid patients was established with all modern necessary equipment, including large x-ray and other laboratories.

In the communication or Etappen zones are the sanitary depots. They are large warehouses full of supplies of all kinds; drugs, bandages, surgical instruments and utensils; household articles for the hospitals, such as woolen blankets, laundry and great masses of provisions. These are constantly replenished from the home departments. Here is also a complete field Röntgen equipment for both the field and war hospitals. The army also possesses a large number of drinking-water machines on wheels. These have proved a great boon in the fight against epidemics which are traceable to infected drinking-water. In these warehouses are also disinfecting apparatus which can be sent wherever required.

TRANSPORTATION OF WOUNDED.—The transportation for the sick and wounded has been generally motorized. At the beginning of the war every available omnibus in the large cities was fitted out for sick and troop transportation. Thereafter autos were turned out as fast as the factories were able. Many were lost in the bottomless roads of Russian Poland.

Accidents of all kinds happen on the wornout roads when they are frozen hard.

The distribution of patients is regulated by the Field Sanitary Chief, assisted by the Etappen Chief Surgeon, who, in turn, is assisted by a special division, a transport division, consisting of seven doctors and the required nursing personnel. This division prepares for the departure by trains, road or boat; cares for lodging, treatment and maintenance en route; arranges the train dispatching between medico-military centers and railway authorities and takes charge of the patients brought in from the field and war hospitals. They prepare stations along the way through volunteer societies where the wounded may receive refreshments and fresh supplies. The patients received are assorted according to their transportability. Those who are to be sent on are carried to an assembling place, where they receive food and lodging. Once they reach the home territory in the hospital trains, the military railway service has charge of the further progress of the trains, and, if necessary, of the care of patients in so far as that is not done on the trains. A train surgeon is attached to each of these forwarding services and he is responsible for all medical matters, especially for the distribution of the wounded to the various hospitals along the route. He is furnished with information as to the number of vacant beds in each town, its medical personnel, etc.

There are three kinds of trains for the transportation of the wounded: (1) Hospital trains, (2) association hospital trains, and (3) trains for the sick who can sit up and care for themselves en route.

The first two are prepared in time of peace; they are complete hospitals on wheels. The personnel of a hospital train is as follows: 1 chief physician (Oberstabsarzt); 3 assistant doctors; 1 field hospital inspector; 1 corporal, locksmith by trade; 4 privates (2 cooks and 2 assistants); 16 sanitary non-commissioned officers; 16 male military nurses; 5 train sol-

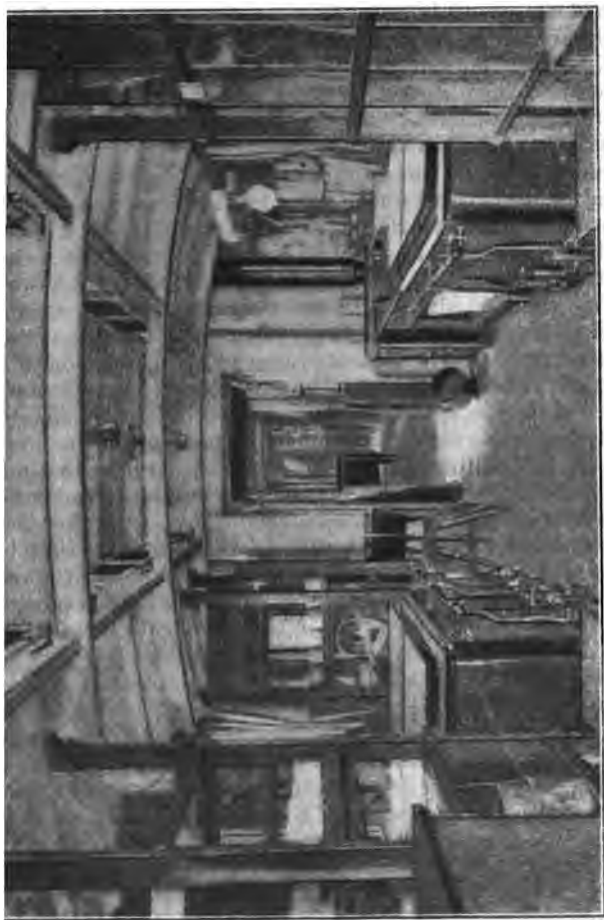


FIG. 31.—Kitchen car of hospital train.

diers; train crew; conductors, engineers, firemen, etc.; 24 cars for the wounded with 12 beds each—288 beds in all; 1 car for officers with 8 beds; 1 car for the chief surgeon; 1 car for the assistant surgeons; 2 cars for medical personnel, etc.; 1 car for the administration and the dispensary; 2 kitchen cars; 3 boiler cars; 2 provision cars; 1 general supply car; 1 baggage car.



FIG. 32.—Field railway car arranged for sick. Iron frame over which tent flaps buttoned together make the roof. For 8 litters with Grund system.

By the generosity of individuals, communities and societies, particularly those of the Red Cross, Knights of St. John and Malta, there are besides these official hospital trains, numerous additional or so-called association trains at the disposal of the medical administration so that there is no lack of them. These trains are now nearly 300 in number. Very definite rules are given, compiled and printed,

to regulate the standard of equipment. They all have this in common, that they are travelling hospitals with full equipment for everything concerned with the care of the sick.

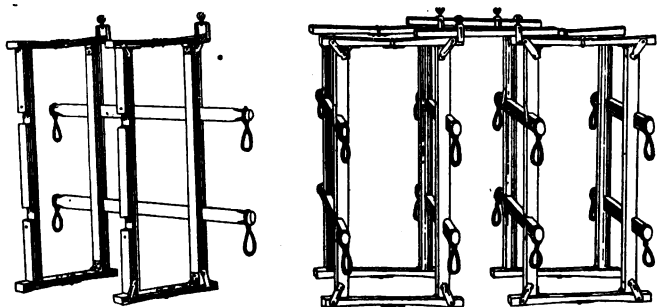


FIG. 33.—Homann's litter racks. For 4 litters; wooden rectangular frames (set up).

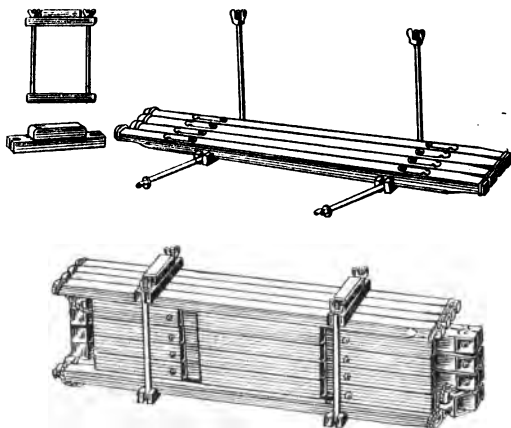


FIG. 34.—Homann's litter racks folded.

The official hospital and association hospital trains have their own physicians-in-chief who must be regular army

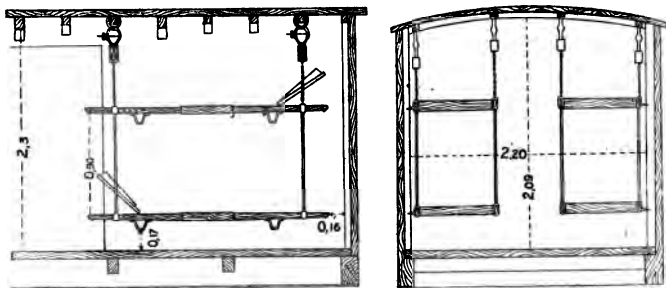


FIG. 35.—The Hamburg arrangement installed.

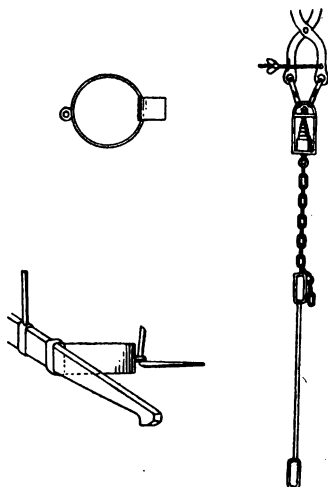


FIG. 36.—Parts of the Hamburg arrangement.

medical officers. The association trains sometimes have either a chief physician or a directing physician who is not a regular army officer but a competent volunteer commissioned from civil life. In the latter case the association trains have each a railroad transportation official who is appointed by the proper military authority in command. Volunteer nursing is done in the association trains by men as well as women nurses; in the official trains it is done by the military medical personnel only.

These trains which are used for the transportation of bed-ridden patients are not to be confused with the trains of the third class for the slightly wounded (*Krankenzüge*). Those who are able to sit up are transported in trains of third-class carriages. They do not receive their meals on the trains but at refreshment stations in the railroad depots along the way. They do not sleep on the trains but are quartered at "overnight stations." It is often reported that the wounded are transported in freight and sometimes even in cattle trains. Of course this happens; however, this is not a regular nor a desired means of transportation and has been resorted to by the medico-military authorities as a makeshift in the stress of war. No matter how many hospital transports there are, there will be times when these simply cannot reach the scene. Troop transports, munition and provision trains always take precedence; the troops at the front must first of all be kept in good physical and good fighting condition. When the cars are unloaded and if many wounded should lie there awaiting transportation, they are always anxious to take advantage of the first, even if the worst, opportunity to reach the home hospitals. Perhaps the most overwhelming impulse of a wounded soldier is to get home. This is quite comprehensible; and they are not forced to remain for days in ruined sheds, lying on straw, where they are very uncomfortable, but are allowed to go in any cars available, but it is not admitted that it is a regular,

authorized mode of transport for wounded. Sanitary transport commissions meet these trains at the frontier with a supply of blankets, mattresses, pillows, dressings and provisions to make everyone more comfortable, or the wounded are transferred at the border into regular hospital trains, should any be available. The medical department also has hospital ships when water routes are possible.

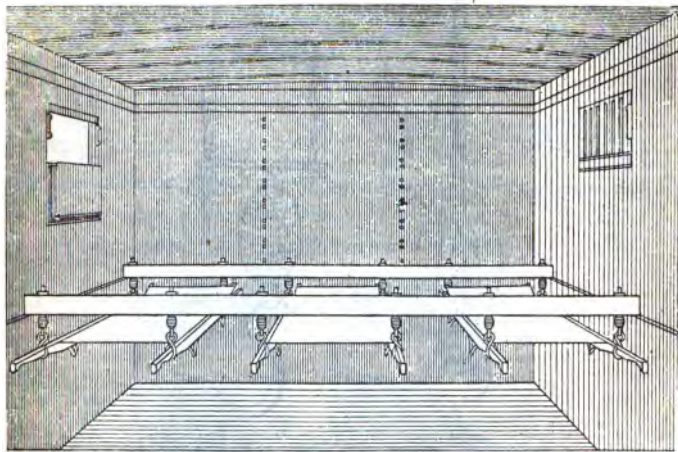


FIG. 37.—Hunsdieck's hook appliance. Litters suspended.

Upon their arrival in the home-land the patients are distributed among the proper regular, reserve or association hospitals, according to the nature of their wounds or sickness and the number of beds available. The medical department does not confine its efforts to the treatment in hospitals alone. There are convalescent homes, private resorts, medico-mechanical institutions, military sanatoria, baths

and other sanatoria, institutions for the blind and special institutions such as homes for cripples.

The transportation of sick from trains to the hospital is by ambulance and stretcher, or, when the hospitals are some distance from the depot and street railways are available,

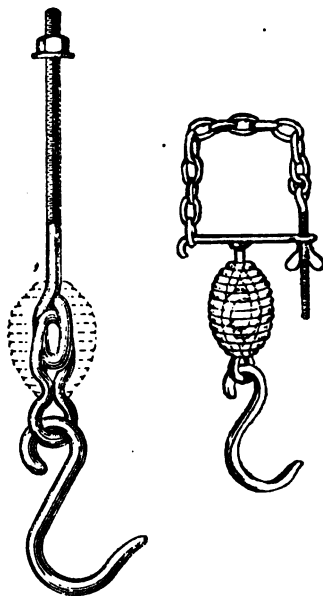


FIG. 38.—Hunsdieck's hook appliance.

the street cars are adapted for six litter cases and a cut-out track is laid into the hospital grounds from the street; when the street railway runs past the entrance of the hospital, a side track is not necessary as the unloading is done rapidly; the patient uses the same litter from the train or ship to the

hospital bedside; only his clothing and personal effects accompany him from the front. When the railroad tracks run near a hospital or group of hospitals a siding is sometimes arranged with special unloading platforms and inclined boardwalks, right into the hospital grounds.

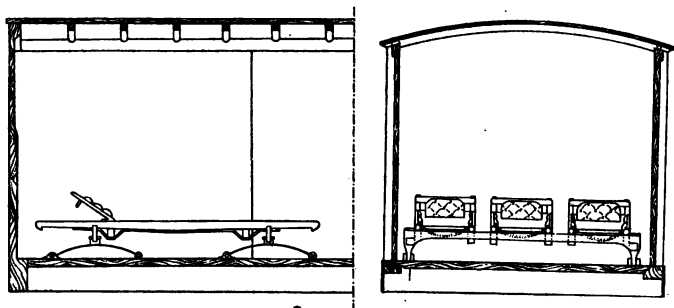


FIG. 39.—Grund's litter arrangement.

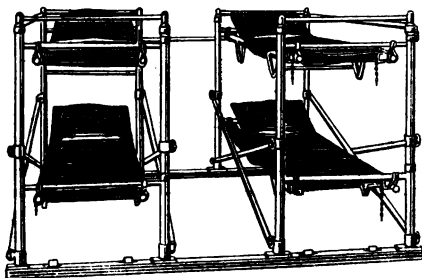


FIG. 40.—Linxweiler arrangement.

THE DEVELOPMENT OF HOSPITAL TRAINS.—The plan of utilizing the railroad for the transportation of wounded and sick from the field of battle into the hospitals and infirmaries at the rear developed in Germany for the first time in the

year 1859. It was proposed to transport the slightly injured in a half-sitting or reclining posture, placing the wounded

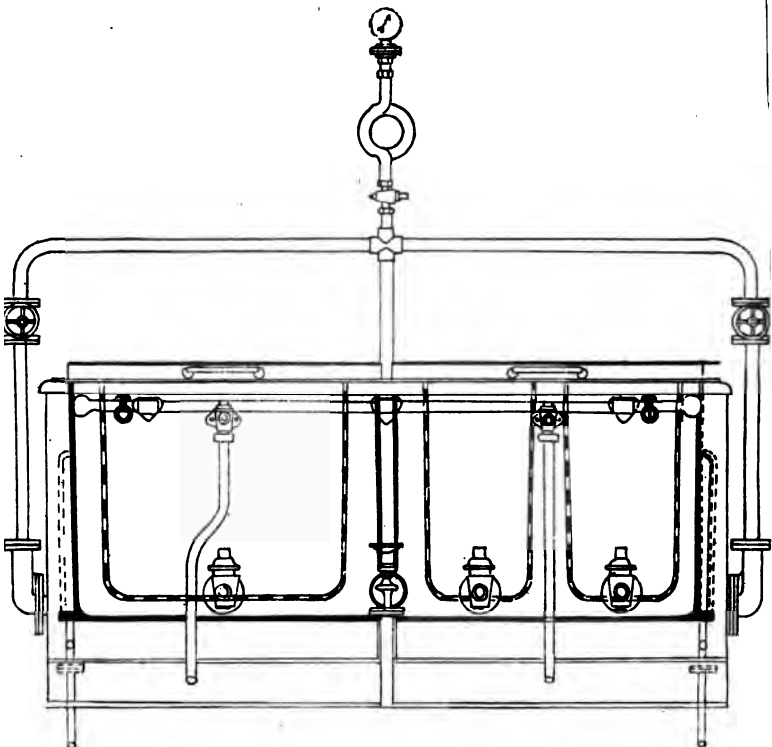


FIG. 41.—Kitchen car. Steam-cooking apparatus.

member in some support suspended from the ceiling of the car; the badly wounded and those suffering from wounds of

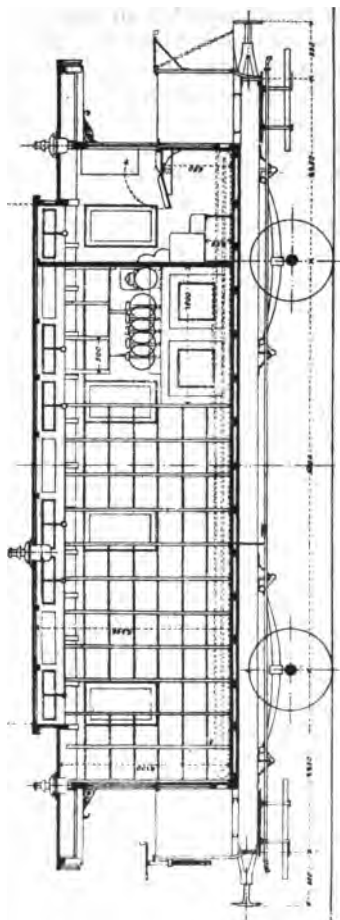


FIG. 42.—Luggage car.

the body were to be transported in large slings fashioned after the manner of marine hammocks. By others the suggestion was made to place the wounded on mattresses made of horsehair, which rested on frames fitted with straps, protected against concussions and shocks from below by means of buffers made of horsehair.

The idea of suspending wounded limbs proved to be impracticable. Neither were hammocks of the navy type suitable because of the difficulty of placing the wounded in them, the inconvenience resulting from attaching them to the ceiling and the violent swaying during the trip. The horsehair mattresses with a bolster for the head proved most satisfactory, but because of the high price were excluded from general introduction. Therefore the use of straw sacks was agreed upon, which served the same purposes, of which large numbers are easily provided, and which can be easily filled almost anywhere. In order to avoid a change in the posture of the wounded as much as possible, the strawsacks were provided along their length with three strong loops, through which eight-foot poles could be placed; in this way a straw-sack litter was provided.

The result of numerous experiments with the most various contrivances was recorded in the "Directions for the Transportation of Wounded and Sick Soldiers on Railroads" of July 11, 1861. According to these regulations sick and such as were suffering with wounds of the upper members, or slightly wounded, who could enter the cars without assistance, were to be transported in a sitting posture in cars of the first, second and third classes. The cars of the first and second classes were intended for officers and for such as required greater care, the cars of the third class for the more slightly injured. There was no special equipment in the cars; the injured, however, were placed in such a manner that the injured part was turned toward the interior of the car, so that they could comfortably lean back in a corner.

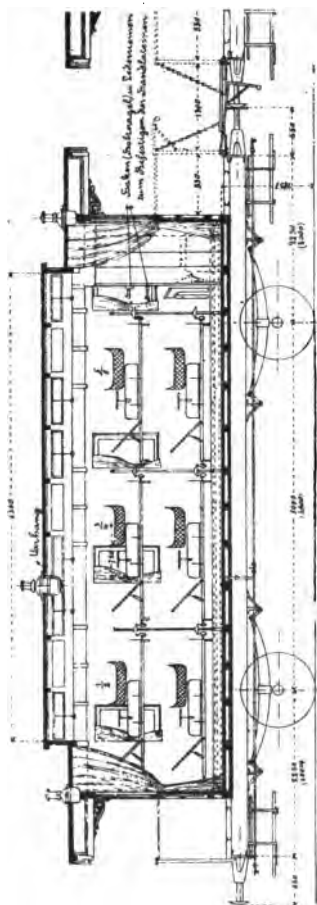


FIG. 43.—Hospital car for 12 beds.

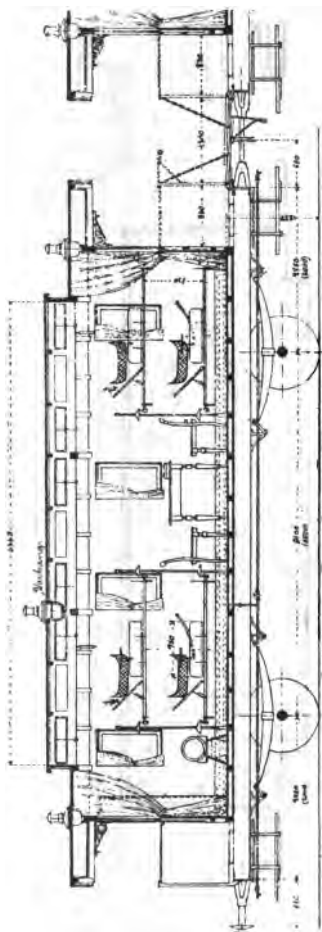


FIG. 44.—Hospital car for 8 officers.

Covered, or in case of necessity, open freight cars, provided with high and solid side walls, served for the transportation of badly wounded and the very ill. The wounded were placed on straw sacks with bed-pads, or if these were not attainable, upon a heavy layer of loose straw or hay. Every car contained from seven to eight straw sacks, three at each end of the cars and one or two in the remaining space in the middle. As additional equipment for every hundred patients, fifteen water jugs, thirteen cups, fifteen dessert spoons for administering medicine, five bed-pans and sixteen urinals were provided. The doctors accompanying the transport had to supply themselves with the necessary materials for dressings, with medicaments and with instruments. At the time the army proceeded to the front, bedding material, etc., required for the transportation of the wounded was deposited at suitable railroad points; in case of necessity it was also taken from the field hospitals.

Even if these preparations and contrivances proved satisfactory in general, and although in many instances they were used to good advantage during the war of 1866, they nevertheless could not give satisfaction very long. Consequently at the end of the war attempts at finding more suitable contrivances for bedding the wounded were resumed. A system adopted from the American Civil War, according to which the litters are suspended from rubber-rings fastened to the hooks on the side walls of the car, gave so much satisfaction that the minister of trade in 1867 issued an order that in all the new passenger cars of the fourth class, hooks were to be attached for the support of litters. At the same time samples of the rubber rings and for the connecting rings on which the ends of the litter rested, were sent out; these were produced in large quantities, and 250 of them were assigned and listed for every sanitary supply depot in the army. Attempts to place three litters on bars, which were

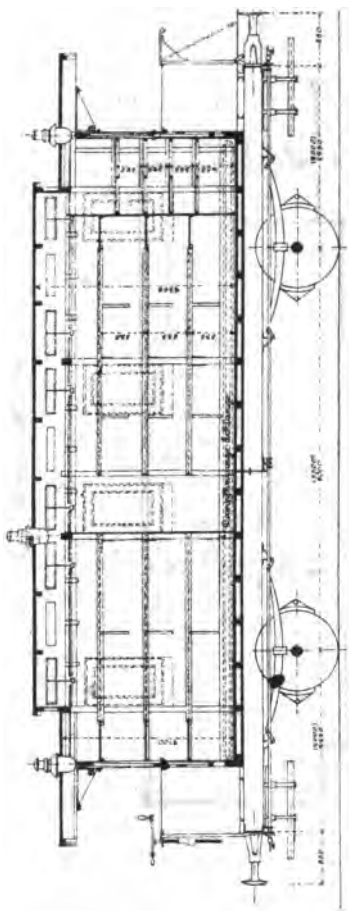


FIG. 47.—Front supply car.

suspended from rubber rings, gave unfavorable results, as the rings would not bear the weight.

The method of suspending the litters from rubber rings also had its drawbacks. The contrivances on the side walls and ceilings demanded special preparations on the part of the railroad authorities, which it was not possible to carry out everywhere; equipping the cars in case of necessity was troublesome; on unloading the litters the hooks were at times torn from the walls, and the rubber rings yielded too much. For that reason an engineer took up the old idea of

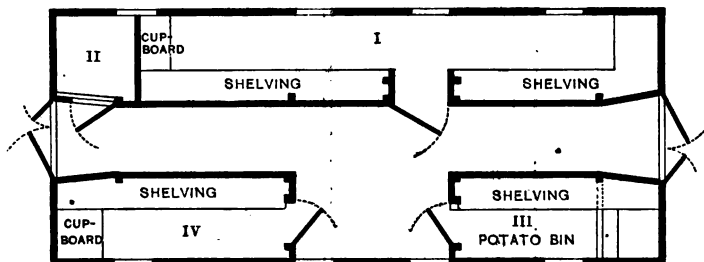


FIG. 48.—Front supply car. Floor plan.

placing the wounded upon the floor of the car. For beds he made use of the litters introduced in the army and protected them from shocks by placing them on leaf-like springs. Three systems were tried out. At first one of these springs was attached to each handle-bar of a litter; but the light weight of the loaded litter did not cause the springs to yield. In order to increase the weight, therefore, an iron stand was placed on the springs, on which two litters could be placed one above the other. This contrivance gave satisfaction, but was rather expensive, and required a large supply of frames. The greatest satisfaction was given by placing

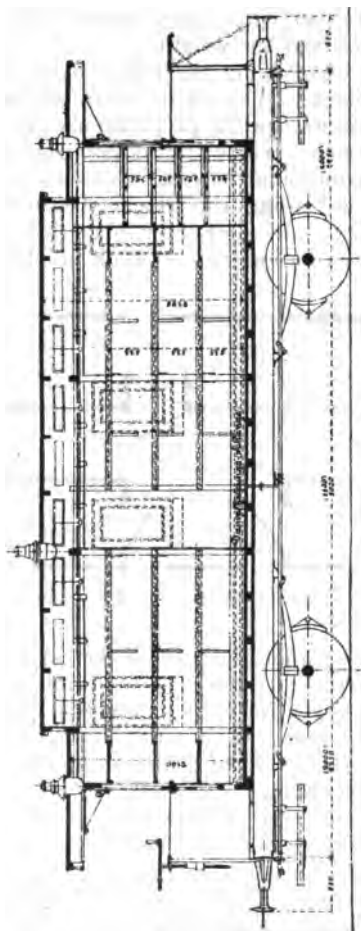


FIG. 49.—Rear supply car

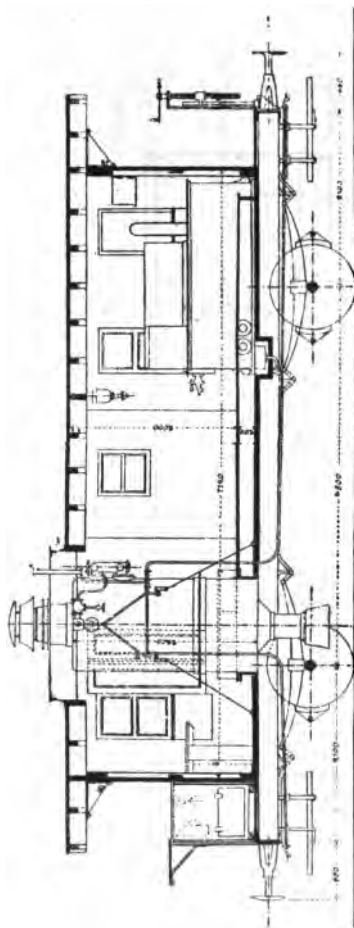


FIG. 50.—Car for hot-water boiler; 2 axles.

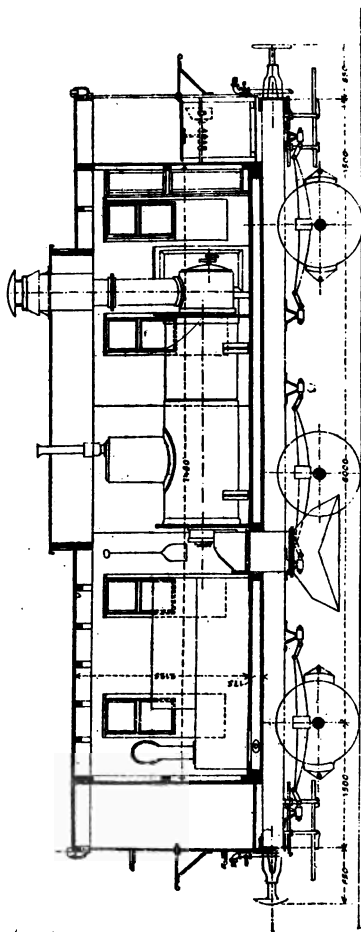


FIG. 51.—Car for hot-water boiler; 3 axles.

three litters on two bars resting on the above-mentioned springs. This contrivance was accepted by the commission appointed for that purpose, and introduced into the army as the *Grund system*. In 1869 samples of leaf-like springs were issued, and forty pairs of springs and forty bars were provided for every sanitary supply depot.

The introduction of the new contrivances required a change in the former regulations. The "Directions for the Transportation of Wounded and Sick Soldiers on Railroads," made allowance for the altered conditions. It took into account the two new contrivances for transportation, but reserved for emergencies the method of bedding on straw sacks. Besides the bedding contrivances it prescribed as additional articles of equipment for every car: one lantern, one signal flag, six woolen covers, one commode, one wine glass, two drinking cups, and one graduated porcelain cup for administering medicines. According to special regulation, the oldest physician accompanying the train had to see to it that the necessary medicine, bandaging material and instruments, spirits of ether and chloroform, liquor ammoniæ acetatis, liquor ferri sesquichlorati, tinctura opii, one syringe (Pravaz), and acidum citricum for the preparation of refreshing beverages were taken along, as well as refreshments, zwieback, biscuits, cereal, rum, arrak in the colder season, also coffee, tea, beef-extract, and an alcohol lamp with tea-kettle. Cars equipped in this manner were to be attached to other railroad trains; or, if conditions permitted it, they were to be combined into special trains for the transportation of wounded. In accordance with these regulations hospital trains were equipped that were used in the war of 1870 to 1871. The experience gathered on the field of battle, however, soon required a more abundant equipment of the cars. Furthermore, because of the long distances which the hospital trains were compelled to

travel, the addition of a medical car, kitchen car, etc., could not be dispensed with.

Thus the Prussian hospital trains, which were used during the second part of the campaign of 1871 were composed of 20 hospital cars, 1 kitchen car, 2 supply cars, 1 administration and apothecary car, 1 car for physicians, 1 car for women personnel, 1 car for fuel, and 1 baggage car; in all of 28 cars with 200 beds.

As hospital cars, passenger coaches of the fourth class with double end-doors, end-platforms and bridges between were used. They contained in the front and rear part of the car four posts with hooks for screwing on barrier boards at two different heights. After the removal of the boards the beds, simple litters, were fastened into these hooks by means of rubber rings. During the continued use of these rings, however, it now became apparent that they became brittle, hard, and inelastic under the influence of cold; under the influence of heat, on the other hand, they would yield too much and stretch, so that the litter would be in a slanting position; sudden breaking of the rings was also frequently observed. As a substitute, springs after the fashion of buffer springs gave good satisfaction; they gradually replaced the rubber rings.

In every hospital car there were twelve litters, six arranged on two sides of the car, which left an aisle in the middle of the car about 1 meter wide. Later on with the increasing cold weather, when the cars had to be heated with stoves, the two middle litters on one side were removed. In the cleared space a stove was put up. For the illumination of the cars during the night the usual coupé lanterns attached to the ceiling and to the ends of the car were used. In addition every car had a hand lantern with a candle. The cars were ventilated by means of ventilation pipes in the ceiling, slides in the side walls, and movable windows at the ends.

For a kitchen car a passenger coach of the fourth class

was also used. Its equipment consisted, among other things, of a cookstove with two tanks for warm water, a frying oven, warming cabinet, cooking utensils, coal box, racks and wallboards for the dishes, spice cabinet, etc., and an icebox on the outer platform. In this car all the meals for the entire personnel of about 240 men were prepared.

As supply cars freight cars were requisitioned, in one of which barrels, boxes and sacks were deposited, and which, aside from a space for soiled wash, had no equipment. In the second car, however, by means of partitions a center aisle and four compartments had been constructed.

The administration car, a third-class passenger car, had three compartments, of which the largest furnished the living and sleeping room of the superintendent and of an assistant physician, and was fitted out with collapsible beds, tables, etc.

The physician's car contained in one compartment of the first class a sofa, table, mirror and other equipment for the chief physician. A compartment of the second class with a bedstead was intended for the first assistant physician. A narrow space between the two compartments contained lavatories and toilets. The car for the women nurses was similarly furnished. The men personnel slept on mattresses in the aisle of the hospital cars. A baggage car served as depository for the clothing and weapons of the wounded and as a shop for the locksmith, an open freight car for the fuel, etc.

These hospital trains, the composition and equipment of which had developed out of the requirements in the course of the second campaign, presented an exclusive formation, the connection of which with trains not used for the transportation of wounded was not allowed on general principles. They were the first of their class and were put into commission not only by Prussia, but in a similar manner also by other states.

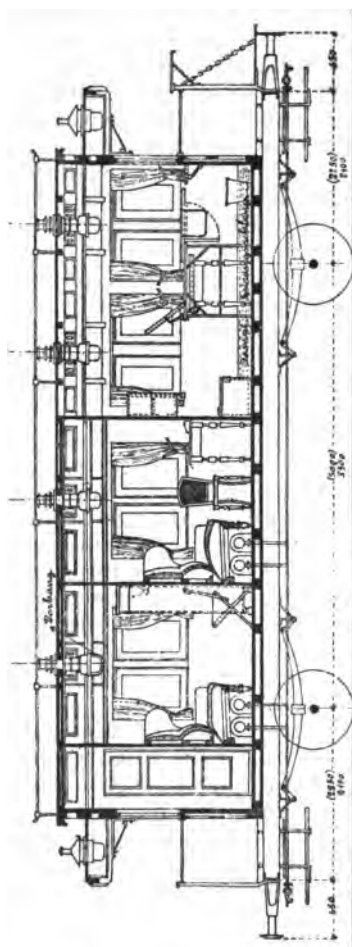


FIG. 52.—Chief surgeon's car.

A bedding contrivance for wounded departing from the one described was in possession of the Hamburg Hospital Train, which was made up of requisitioned cars at the theater of war. The contrivance consisted of iron clamps fastened to the ceiling of the car, from which, by means of hempen loops, litters were suspended by twos. Sideward swaying of the litter was prevented by fastening one side to a hook.

The suspensory system has also given the best satisfaction, so that it was employed in addition to the Grund system for permanent hospital trains in the experiments conducted on a large scale in the years of 1876 and 1877. In so doing the bedding litters were replaced by army litters, the hempen loops by iron chains; in place of the straps used to prevent sideward swaying an elastic steel ring was employed.

As a result of the experimental trips of 1876 and 1877, the railings of the platforms of the fourth-class passenger coaches were made collapsible, in order to facilitate the loading of the wounded.

Also a "mixed system," in which the upper litters were suspended from the ceiling according to the Hamburg method, while the lower ones rested on the Grund spirals, was tested and introduced.

The result of the experiments was embodied in the war sanitary regulation October 1, 1878, after the number of the hospital trains to be held in readiness in time of peace had been fixed at six. In addition the formation of auxiliary hospital trains and hospital trains which did not require any preparation at the theater of war was provided for.

According to the war regulations no essential alterations were made in regard to the purpose and equipment of hospital trains, which were composed of passenger coaches of the first three classes, and in case of necessity, of coaches of the fourth class, and of freight cars with straw sacks or heaps of straw.

The auxiliary hospital trains consisted of freight cars or passenger coaches of the fourth class with bedding contrivances, according to the Grund, the modified Hamburg, or the mixed system. In every hospital reserve depot 320 equipments according to the Hamburg, 240 according to the Grund, and 400 according to the mixed system were kept in stock, in all, accommodations for 960 wounded. Besides the bedding contrivances a number of mattresses and covers, as well as one water can with drinking cup, one glass or porcelain cup for administering medicines, one commode, one lantern for the illumination of the train, one hand lantern, and one signal flag were a part of the equipment of the trains. In the way of food for the sick, zwieback, biscuits, wine, rum or arrack were to be kept in store. The physician was required to provide for morphin solution with a Pravaz syringe, tincture of opium, chloroform, liquor ammoniæ caustici, liquor ferri sesquichlorati and spiritus ætheri. The cars were marked with the Red Cross on the exterior by means of pieces of canvas.

The new regulation provided for an essential change and enrichment in the formation and equipment of hospital trains. The number of hospital cars was increased from twenty to thirty, that of the supply cars was doubled. In place of the car for the women nursing personnel two cars for sanitary troops were added. The entire hospital train consisted of forty-one cars with three hundred beds.

The hospital cars for the transportation of wounded (passenger cars of the fourth class) were partly prepared in time of peace. For ventilation especial suction apparatus were attached in the middle of the ceiling. For beds, litters were used, which by means of mattresses and covers were converted into beds. If a wider resting place were required, the three larger litters of one side could be extended by attachments having a width of 20 cm.; suitable mattresses, etc., were also provided for. Every injured soldier received

underwear. A special list was made up for the medico-chirurgical equipment of the train, which, besides an abundance of sanitary gauze, splints, sand-bags, etc., included also an apparatus for chloroforming and several cases of surgical instruments. In the medicine cabinet were kept chiefly antiseptics and the necessary medicines, as well as the most indispensable apothecary implements.

The formation and equipment of the hospital train as created in medical regulations of 1878 has on the whole been retained; nevertheless in the course of the years a few more additional changes were found necessary. Thus in 1887 a sleeper for wounded officers and seriously wounded men was added in place of the hospital car of the fourth class, but was discontinued in 1903. With the introduction of steam heating in the railroad trains the former stove heating system fell into disuse. Inasmuch, however, as the long hospital train could not be sufficiently supplied with steam by the locomotive, three boilers had to be included in the train. The fuel car was eliminated. At the same time the number of beds was increased from ten to twelve, so that with the same number of beds the number of hospital cars could be reduced. Instead of the former cooking stove in the kitchen a steam cooking apparatus was installed, and instead of the numerous small cooking vessels three large cooking kettles of galvanized iron with a capacity of 65 and 40 liters. The vats for infected wash, which had formerly been installed in the fuel car, the wooden block with hatchet, the sawbuck with saw were removed to the boiler car. Instead of marking the cars with paint, signs marked with the Red Cross and the number of the car were provided for.

The most essential change concerned the beds. The litters, especially on account of their scanty width, had proved to be inadequate; also the contrivances for suspending them were far from satisfactory. For that reason a commission met in 1899, in order to find some contrivance which would

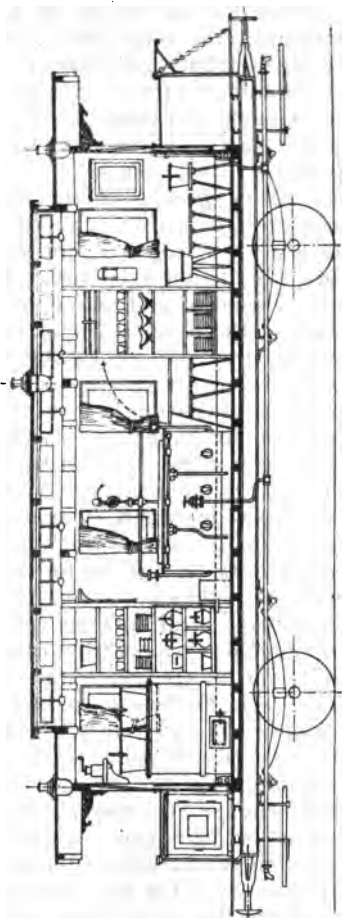


FIG. 55.—Kitchen car. Water reservoir side.

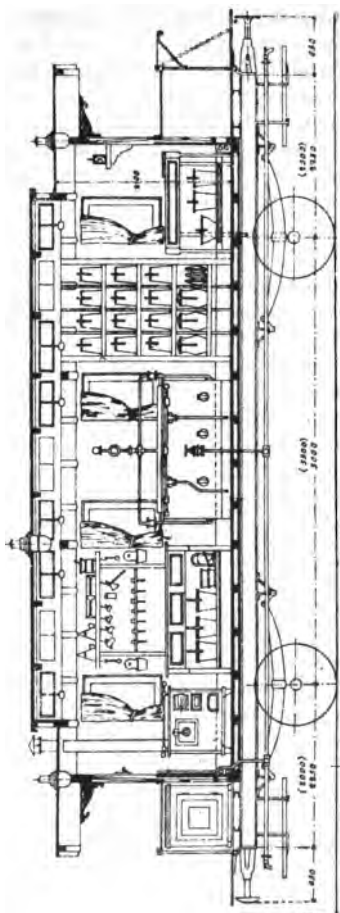


FIG. 56.—Kitchen car. Range and oven side.

be absolutely suitable, as free from shocks as possible, and at the same time inexpensive. Manifold experiments with spiral beds, inflated rubber mattresses, etc., with a large number of suspensory apparatus, which were tried out in numerous test trips, did not furnish results. Not until 1894 was a new system introduced which, with the diligent coöperation of Dr. von Coler of the general staff, was suggested by the railroad director Garbe.

In 1898 a supply car was introduced in place of the freight car, and in 1900 the equipment of the refectory was increased by wooden compartments for mattresses, by racks for preserves, wine, etc., by cabinets for laundry, material for bandages, and instruments.

The last extensive changes were made in 1905. The sleeper was eliminated; a hospital car for officers and a car for the chief surgeon, with operating room were added. The coco matting runners in the hospital car were replaced by linoleum and the candle lamps by emergency lamps furnished by the railroad administration.

After the medico-chirurgical equipment had experienced a slight change as early as 1899 it was altered in 1907 in accordance with the new sanitary regulations. The last alterations were made in 1912.

The hospital trains are military units, formed according to military regulations with a suitable crew and equipment for the transportation of sick and wounded. Their equipment is kept complete in store during peace.

The order of the train is retained in general, and in case of the addition of other cars or the exchange of damaged cars, it is restored as much as possible. The chief surgeon may authorize a transposition of the officers' hospital car or of one or two of the last cars behind the car of the chief surgeon, if the interest of the patients urgently requires it, and if from a technical point of view it is not open to objection; for instance, in order to bring wounded, who

are in need of operative measures, closer to the operation car.

A hospital train beginning with the locomotive now consists of:

1 baggage car with brake	2 axles.
1 supply car with brake	2 "
1 medical car with brake	2 "
1 hospital car for officers	2 "
1 car for sanitary staff with brake	2 "
1 car for head physician with operating room	2 "
2 cars for the sick	4 "
1 boiler car with passage and brake	2 "
4 cars for the sick	8 "
1 supply car with brake	2 "
1 kitchen car	2 "
5 hospital cars	10 "
1 boiler car with passage and brake	2 "
4 hospital cars	8 "
1 supply car with brake	2 "
1 kitchen car	2 "
1 administration and apothecary car with brake	2 "
5 hospital cars	10 "
1 boiler car with passage and brake	2 "
4 hospital cars	8 "
1 car for sanitary staff with brake	2 "
<hr/> 39 cars	<hr/> 78 "

All cars in the selection of which special attention must be given to speed, carrying capacity and useableness, are thoroughly connected; the railing of the platform of the hospital car, and of the rear platform of the surgeon's car, as well as that of the entrance to the operating room are collapsible. The cars are designated by means of signs of sheet-iron which are attached at the middle of the sides close to the roof. One sign bears the Red Cross, the other the inscription "Hospital Train No. — with the exception of the car of the chief surgeon, and below, is added the purpose for which the car is intended. The hospital cars bear the numbers 1 to 24.

The cars are heated by steam from the boiler car; the heating system must be so constructed that it can be turned off in any car without disturbing the heating of the rest of the cars.

The braking appliances in connection with the hospital kitchen and medical car may be used only if the tractive force or grades of the track require it.

Besides gas illumination, every car is illumined by emergency lanterns. The chief surgeon's car and the medical car are each provided with eight, all the rest with four emergency lanterns. The lanterns together with accessories are furnished by the railroad administration. The shades for the lanterns are stored in the car.

All parts of the equipment for hospital trains are provided on the back or at other suitable place with the inscription of the respective car. All utensils capable of being kept under lock and key bear in addition an inscription designating their place, for instance administration car, etc. Such articles as are not to be removed from place are screwed to the platform, to the floors, or to the sides of the cars.

ADMINISTRATIVE METHODS OF THE SANITARY SERVICE IN THE GERMAN ARMY.

THE sanitary heads of the armies, corps, divisions and lesser units, like the heads of all other departments, are subordinate to the commanding officers of their respective organizations. They submit their recommendations to the respective chiefs of staff and these, when approved, are published in orders in normal times; but soon after the field operations became intense the medical department chief was authorized to issue his own orders and his department became as elastic and independent as military and tactical dispositions permitted. Red tape practically disappeared so far as paper work was concerned and all that remained was such orders in writing as were necessary to establish special authority, to furnish vouchers for expenses, "Round Robin" information, general communications, etc. Nearly all other official matters were communicated by telephone, telegraph, wireless or by messenger. The records in which there can be no slighting of regulations are the personal histories and the clinical records of patients. Justice to the patient and to the government demands that as perfect records as possible be made and preserved, of everything concerning service and disabilities. The form of official correspondence is very simple and resembles somewhat the one now in use in the United States; the signature is made

with an indelible pencil and bears the last name only of the signer, sometimes with the prefix "Dr." The scarcity of typewriters is noticeable. The telephonic and telegraphic communications are practically universal and give excellent service from the most advanced frontal positions to every part of the Empire. Matters of general importance are always transmitted in writing through service channels, otherwise the field post is not much used. Everything possible is eliminated in the interest of speed and economy and the result has been that the medical department is never behind on this account.

RECORDS AND CORRESPONDENCE.—All departments of the army use a stamp on all official papers which vouches for their authenticity. This seal is a small, handled, metal stamp with a seal one inch in diameter, bearing the national coat of arms in the center and around the rim appears the name and locality of the department or detachment. The inking pad is usually blue. There seems to be no standard size for paper used in correspondence but the appearance of this impression near the signature marks it as official business. This seal is used for franking mail matter; it also serves to record the hospital, department, etc., and the locality. A date is always indicated by numerals giving the month first, a dash, the day of the month, a dash and the last two figures of the year; in speaking of a date these figures in this order are often quoted. These customs of the indelible pencil, the stamp, the numerical dating and the signature by surname only, all contribute to time saving. The clerical force required is but a small fraction of that for similar organizations in the United States army. Every man is too great an asset in Germany to be employed in any work except something that counts, and they are now employing real efficiency methods for the first time in their existence, which has been defined by an American as knowing what is wanted and then doing it in the quickest and most economical

manner possible. As it is, there is no exaggeration in stating that on account of the shortage of doctors every medical officer does the work of two and sometimes three men; without this service on the part of the members of the sanitary department it would break down for lack of trained officers. There are only 40,000 active medical men in Germany and over 25,000 of them were in the army in February, 1917. This condition applies throughout the whole army. Germany now employs its full man-power. In the medical department a large measure of authority is allowed, especially on the front and in the lines of communication. The nearer one approaches the home departments, where many old, paper soldiers, who were called to service from retirement, are in charge, the more in evidence are irritating red tape administrative methods and delays due to incompetency and indecision.

This is one of the reasons why all officers assigned to home stations are so anxious to get back to the front where it was long ago recognized that it would be a physical impossibility to juggle red tape with one hand and fight battles with the other; this is a war in which more blood than ink is spilled. At the front a man is given credit for all the ability he possesses, is allowed to exhibit it and there every success is noted, duly appreciated and recognized and he is neither unhonored nor unsung. Both men and officers, as a general thing, subsist much better and lead wilder lives at the front, breathe an air untainted by politics, and also they receive more pay. Here also many of the reserve and officers from civil life who are untrained in administrative methods, the details of which are annoying and often exasperating, are enabled to give their best service. When serving on boards where the special knowledge of these men is of great value, a regular army officer is always included to keep the records straight with department regulations. While extensive authority within their jurisdiction is exercised by chief sur-

geons nearly all play safe whenever in doubt by referring questions, through channels, to the corps surgeon. Corps organizations, except when incorporated in an army, are, except in matters concerning imperial great-headquarters, expected to be quite independent, and as there must be over one hundred corps in Germany alone, the wisdom of this is evident. Each corps at the front has its duplicate, a reserve corps in the home country, training men and accumulating materials to fill gaps at the front so that the front forces are always the same in strength and equipment according to their needs. Questions referred to corps headquarters can usually be settled by the daily telephonic conference and other matters requiring more consideration are taken up either by correspondence or at personal, weekly meetings between the corps surgeon and subordinates at headquarters or during his frequent trips of inspection. Distances are not great in Europe and close touch is easily maintained between organizations.

LINE OF AUTHORITY.—The relative rank of positions in the sanitary corps is maintained from great-headquarters down, except when frequent shifting of organizations occurs from one army to another, in which case attempts to preserve relative ranks would result in unnecessary dislocation of staffs; when this occurs usually military necessity requires that nearly all control over staff officers of all kinds be exercised by the commanding officers until, at least, the command again becomes more or less settled. The rank of medical officers of the sanitary corps is more pretentious than the emoluments supposed to go with general rank. Ample provision for general rank is made but the first or lowest general, "Generaloberarzt," has the pay and emoluments of a lieutenant-colonel; the next higher rank is that of "Generalarzt" with the pay of a colonel, and the third and highest general rank is that of the chief of all the service, on the Emperor's staff, an "Obergeneralarzt," equivalent to that

of a major-general. Nothing contributes more to the spirit and discipline of the corps than unfailing personal and official courtesy, full collegial sympathy and the unselfish recognition of ability, which latter sometimes results in a young man filling the position of chief surgeon of a department over older colleagues, with apparent satisfaction to all. Under all this, however, is an iron discipline, rigidly enforced at times. Perhaps the lesson of greatest importance to any army that can be learned from the Prussians is the instant, rigid, yet graceful military courtesy and smartness invariably exhibited on all occasions, whether in or out of uniform, so essential to perfect discipline, and revealing the alert and aggressive soldier; something approached only by our navy officers and graduates of West Point.

SYSTEM OF MEDICAL INSPECTION.—The duties of a chief surgeon of an army or corps are the usual ones in all armies; advisor to his commanding officer, director of all sanitary and medico-military measures concerning supplies, personnel, equipment, records and coöperation with other units. One of the most serious tasks of sanitary chiefs is in combating epidemic disease; suspected cases of contagious and epidemic diseases are never allowed into home territory; when and wherever they occur there is always a barracks hospital available for their isolation and treatment. Periodic and frequent inspections are made of every phase of the sanitary service by both individuals and boards. The corps surgeon will personally inspect first one part of the service and then another until everything has been covered. The observing or consulting surgeons of the corps, who when not on this or other special details have a surgical hospital of their own, limit their inspections to the clinical aspects of the surgical cases, make recommendations and in some cases demonstrate certain surgical procedures. By keeping in touch with the work of the numerous operating surgeons in the corps, which may have 20,000 beds, these consulting and

advising surgeons act as a clearing house for combining conclusions and for making available to each, the worthwhile methods of all. A special board of three, one of whom must be an officer of the regular service, and the others, men distinguished in civil life, has for its function the examination of all patients who have been in hospital more than two months; their decision in regard to the future disposition of each such case is final; there are also inspecting officers and boards in each specialty; the chief surgeon of each group of hospitals makes regular surveys to cover certain points not touched on by the others higher up, whom he must also accompany during their visits. In addition to these corps inspections, medical inspectors of general rank representing several corps or an army, inspect in regard to getting men back to the front from hospitals as soon as possible, which involves a physical examination of each patient, or regarding administrative matters concerning all the armies, etc. So, with the occasional inspections of the line commanding generals from army or corps headquarters and those by the general commanding the garrison, usually combined with those of the corps commander, there is no lack of attention and advice. These inspections, usually announced in advance, are feverishly prepared for and the result represents anything but the average condition of affairs.

The scientific side of the work is not forgotten and is fostered through special research men and weekly, or in some places biweekly meetings of all the surgeons of the garrison, at which the work is discussed after the reading of papers or presentation of clinical cases; a brief social session, with beer, tobacco and perhaps a bite, follows. Garrison staffs hold special meetings to confer on matters requiring a consensus of opinion or to witness some special demonstrations. For three months in the year general meetings of surgeons on duty in a corps are held at headquarters one evening in the week; the travel is on military pass and smaller expenses involved

in attendance are reimbursed. The program for these meetings is published for the entire three months in advance. The addresses are by specially selected men and on special subjects covering all phases of the existence and experience of the medico-military expert in war which could be of value to the service. An annual congress of chief surgeons and of those who have been doing things worth while is held in Berlin, which is also attended by representatives from Austria, Bulgaria and Turkey.

MILITARY BASE HOSPITALS IN GERMANY.

GENERAL PLAN AND SCOPE.—There are 600,000 military hospital beds in Germany and about 80 per cent. of them are constantly filled.

The permanent German garrison military hospitals are all built in times of peace on the pavilion plan, on ample acreage, and are equipped in the most modern manner. In war nearly all civil hospitals are taken over and branch hospitals are opened, equipped and staffed at once in public buildings which have been surveyed and selected with that object in view during peace. Every year these buildings are reinspected by the medical department of the army; the bed capacity of each estimated; the additional plumbing that will be required and all necessary additional equipment noted and instructions issued to the occupants what disposition to make of the furnishings that will not be needed for hospital use in case the building is commandeered for war purposes.

The buildings that offered the best arrangements for reserve hospital purposes, were found to be the school-houses and seminaries with their extensive and well-parked grounds in which barracks could be erected as needed. Some of these buildings are very fine, even magnificent, and make imposing hospitals. So perfectly do many of these schools meet

the needs of modern hospitals in the arrangement of their space, lighting, heating and ventilation that the government was accused of having planned the schools with this disposition in mind. Repeated inquiry on this point brought out the fact that this accusation had often been made only to be invariably denied by the authorities. Immediately on mobilization all military hospitals are designated lazarets. The main hospital, presided over by the chief surgeon of the garrison or district, is called lazarett 1 and the others 2, 3, etc. In garrisons equipped to resist siege the lazarets are called "Festungslazarette" or fortress lazarets 1, 2, 3, etc. Many garrisons in the rear of an active front have as many as 15 branch hospitals. The other branch hospitals in the homeland are called reserve lazarets and are also designated by a number, or if only a few are in a locality they often take the peace name of the building in addition to its military designation, such as "Reserve Lazarett, Girl's School," etc. Schools so dispossessed have other quarters picked out for them in advance, so that when the order comes the school knows where to take up its work again and what equipment it can take with it.

This system resulted in enough hospital capacity being ready in the homeland for the first wounded cases within two or three days from the time the mobilization order was given. It is not considered desirable from either the administrative or the professional stand-point to have hospitals of over 400 beds each, although some of the older civil hospitals have 1500 beds and more. In the Etappe or line of communications, it was planned to have perfectly equipped permanent hospitals staffed by the best men, in order to give the wounded modern care at the earliest possible moment. The hospitals in this zone, if in well-built towns that have not been too badly damaged by war, are in the same class of buildings as in the homeland; if suitable structures are not available, barracks and tentage are set up.

A short description of a base hospital will indicate the general plan and scope of all. As Germany found herself very short of competent medical men for her enormous armies, almost every civilian doctor that could possibly be used was pressed into the service and of course very few had had any experience with military institutions and regulations. The problem was partly solved by schools for civil medical officers with short, intensive courses, and by putting a regular medical officer in administrative command of the hospital whenever the one from civil life was not adapted to such work. Even then many hospitals were without constant regular army direction and had to do as best they might with the assistance on the administrative side of senior non-commissioned medical officers of the sanitary corps. The result is that much of the work of the hospital is either slighted or left undone, as all efforts must be concentrated on the care of the patients. The regular administrative officer must, at times, also serve as medical director and be responsible for and perform professional work as well.

PERSONNEL.—The personnel of a 400-bed hospital is often no more than as follows: 1 administrator, 1 quartermaster, 1 adjutant, 1 medical director, 2 or 3 assistants (one of whom must live in the hospital), 30 women nurses, 35 men nurses or enlisted sanitary soldiers, 1 senior non-commissioned officer, 3 junior non-commissioned officers, 10 corporals, a kitchen personnel of 6, a total of about 85. All other work must be done by patients who are able and willing to volunteer and by details from the garrison troops, who can be recalled at any time by their commanding officer. This forms quite a contrast to the personnel of a de luxe American 500-bed base hospital with one major, 25 captains and lieutenants, 24 sergeants, 14 cooks, 132 privates and 46 women nurses. However, as all have found out, the work has to be done, and as stated elsewhere, each doctor, not only in Germany but in England and France

also, often does the work of two and three, according to our standards. The paper work concerning patients and accounts absolutely must be kept no matter how many hours of work are required. Often the medical officers are obliged to personally write out all of these records, and a twelve- to sixteen-hour tour of duty is not unusual.

The organization of inflexible hospital units composed of a fixed number of doctors and personnel for general hospital work, except for organization and training purposes, would be a mistake. Far greater service can often be rendered the work of the sanitary department by having every member of such groups subject to detail at any time and wherever in the opinion of the chief surgeon of the department his services are most needed. There can even be occasions when a small section of such a staff may be worth more elsewhere than the whole unit.

INSPECTIONS.—The military system is ever present in the hospitals even during the daily professional rounds or visits of the doctors and particularly during official inspections, of which there are many. On stepping into a ward, the first patient that observes the surgeon shouts "attention;" all who are ambulant go to the foot of their beds and stand at attention till the visit is over or until dismissed by the doctor; those lying in bed, if their wounds permit, lie perfectly straight with the arms extended by the side; these are the attitudes of the sick soldier in hospital in the presence of an officer. The officer, however, usually, with a slight wave of the hand puts them as they were or at ease, but everyone must remain perfectly quiet. During an official inspection by officers of the garrison, corps or army, the inspecting officer and his staff are met at the entrance to the hospital by the entire hospital staff and after introductions and greetings, the procession is formed strictly according to rank and as the station of each doctor is reached he leads the way to answer questions and make suggestions and explanations.

Everything to be noted is dictated by the inspecting officer to a non-commissioned officer who is detailed for the purpose. These inspections are usually very thorough and when the nature of the wounds and other circumstances of the men are the subject of inquiry among several hundred patients they take several hours. While all conversation between officers and men on these occasions is in the official tone and the answers are monosyllabic and delivered in a high monotone, there is so much in common now between officers and men, especially wounded men, that on these inspections the interview often melts into a sort of intimacy, and whenever possible the desires of the patient are granted, such as being transferred to the hospital in his home town, and many questions of discharge, furlough, or other disposition of the man are settled. When a man who merits distinction is not going to recover, he is recommended for the iron cross before he dies and should it come too late, it goes to his family. After an inspection which is usually rigid and tiring, when all are again reassembled at the entrance, criticisms are made in a tactful manner, praise given where due, in general terms. If the inspecting officer stays overnight, an appointment is often made to meet in the evening in the café at his hotel for a social session and it is on these occasions that the most interesting experiences are exchanged. His written comments, approval of changes and suggestions follow later.

No military patient is ever forced to submit to an operation. There are cases when through fright or stupidity a man will refuse an absolutely necessary operation but if the obvious necessity for it is carefully explained to him in the presence of his comrades, one can confidently leave the matter there and find that on the next day or the next visit, he will ask for it.

SEGREGATION OF CASES.—The cases are segregated according to their nature in different hospitals or in different depart-

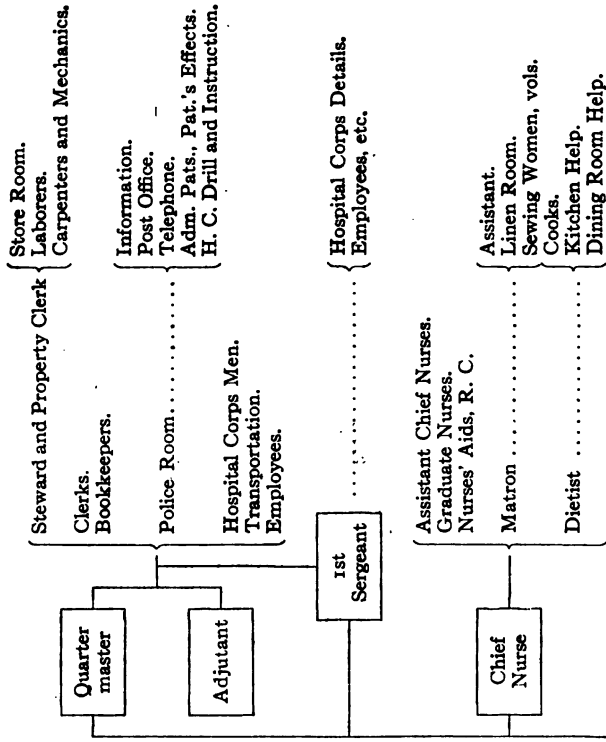
ments of the same institution, and according to the nature of the medical talent available. If a competent surgeon or two are on the garrison staff, a purely surgical institution is given them; usually the hospitals are general for medical and surgical cases. Special hospitals for skin, venereal and syphilis are in charge of specialists who also act as health officers for these diseases in their district and make the weekly official examination of prostitutes, all of whom are under police control. The large number of soldier's heart conditions are sometimes put in charge of a specially capable man in a special hospital; also kidney cases, tuberculosis, mental and nervous disease; and all the epidemic and infectious diseases are treated in isolation barracks, to which they are transferred for observation as soon as suspected.

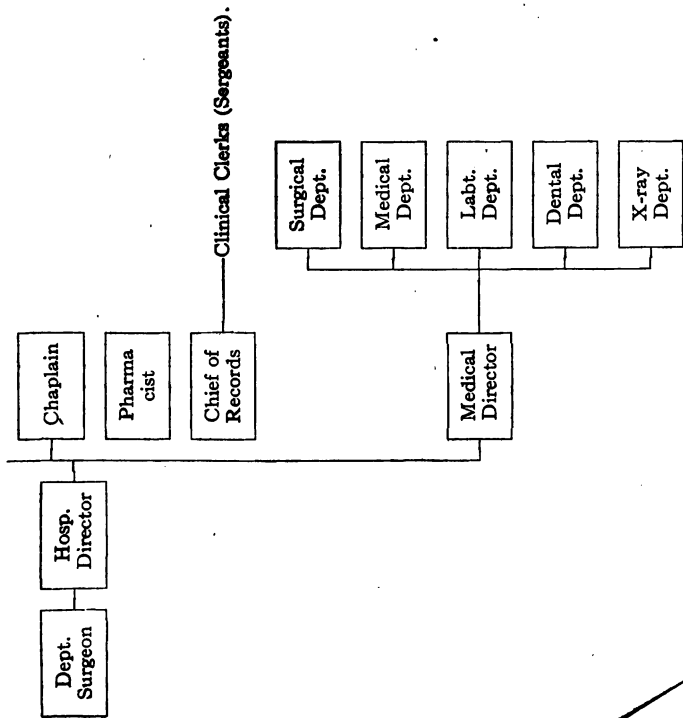
THE INTERIOR ADMINISTRATION FOR A 400-BED HOSPITAL WITH MEDICAL STAFF FROM CIVIL LIFE.—*Lines of Authority.*

1. Garrison chief surgeon. 2. The administrative officer of the hospital is preferably either an active or retired regular medical officer or the civilian medical director himself if he understands regulations; if none such is available, a mature medical man who is known to be business-like in his habits and who can grasp the essentials of regulations. Two hours in the morning and one or two in the afternoon should be sufficient for his official duties, which are to examine and approve routine papers, pass on matters of discipline, make final examinations of patients to be discharged and to advise and correlate the professional work and the nursing department through the doctor and the chief nurse. He holds frequent meetings of the staffs for purposes of instruction.

3. The quartermaster is a regular and competent line officer in charge of all properties, purchases, business affairs and accounts. He is also the mess officer. He is under and responsible to the Administrator except in the matters for which he may be responsible to his department chief in the regular service.

ROUGH DRAFT OF ORGANIZATION FOR A BRANCH BASE HOSPITAL.





4. The adjutant is a good and competent business man, used to handling men; he acts as aid to the quartermaster and is the commander of the employees, patients and hospital corps men. Both the quartermaster and the adjutant should be *persona grata* to the administrator.

5. The first sergeant is in charge of all enlisted details under the quartermaster and adjutant. He keeps a roster of all men and their duties and supervises each step of the work. He assigns a regular twenty-four-hour guard detail and enforces discipline. In general, he has the functions of any battalion sergeant-major.

6. For the police-room personnel, two intelligent sergeants and two orderlies are selected. Their office is at the entrance of the hospital; usually in a room to the side of the entrance with a front window commanding the door of the hospital or gate to the grounds which, if a gate, is latched on the inside and opened by a wire running to the police room, when the gate bell is rung. If possible there should be a side window from this room through the wall into the entrance hall inside of the building so that every person entering or leaving can be seen and interrogated if necessary. This should be a rather permanent detail, if possible, and is responsible for everything and every person entering or leaving the building, twenty-four hours in the day. Here all mail and all packages are received and distributed, all visitors interrogated and advised and the effects of all patients cared for. Here also under the direction of the admitting doctor, patients are assigned to wards and a record kept of their location and of the empty beds, etc. It is the telephone exchange and general information bureau. An official hospital stamp for official papers and for franking telegrams and letters is in the custody of this office. The administrator's office has a similar stamp. The two sergeants sleep in the room and have their meals served there to insure continuous service.

7. In the recording station about five men, sergeants and

corporals, some of them advanced medical students, if possible, are needed for the medical records. They must have a separate room, a large desk and filing spaces. Here are kept all clinical histories under lock and key; the histories are written up by these men from notes, or directly on the history sheet, at the dictation of the doctor in charge of the patient. One of these clinical clerks is assigned to certain doctors and is always to respond when called on; doctors using the same writer must arrange for this service among themselves. The clerk must remind his doctor that notes on case reports must be made at least twice weekly and when a patient is to be discharged on a certain day the police room and recording station must be notified by the nurse after the administrator or his representative has approved the discharge. On the day of discharge a final examination of the case is made by the administrator with the history clerk to note the final remarks. It is the duty of the clerk to accompany the doctor on his rounds, when requested, and to assemble any records, x-ray plates, etc., that may be needed to study the case, and the clerk is responsible for the safety and refiling of any such records. Completed clinical records are sent biweekly to the garrison chief surgeon's office where they are inspected and correction of defects are ordered. Two of the clinical clerks sleep and eat in their work room, which is partitioned off for the purpose. The daily morning reports are made here and posted up where directed. These men conduct drills and instruction under official direction.

All of the sanitary personnel are under regular training through lectures; exercises and drills conducted by the junior medical officers. Details from the line must attend their regular musters and inspections at their troop station.

MILITARY HOSPITAL DIETS IN FEBRUARY, 1917. 1st *Form.*—Regular diet. Each patient receives 350 gr. bread; coffee; 100 gr. marmalade; 30 gr. sausage (on four days of

the week); $\frac{1}{4}$ liter milk. Dinner: evaporated vegetables and fresh potatoes; beef, 175 gr., or on meatless days, bean soup and bacon. Afternoon: coffee. Evening meal: oatmeal gruel, $\frac{9}{10}$ liter, or potatoes in jackets with herring.

2d *Form.*—Special diet. Each patient receives 330 gr. bread or three rolls, an addition of 165 gr. bread or two rolls; coffee. Dinner: noodles, etc., 60 gr.; beef, 175 gr. Evening meal: oatmeal gruel, etc., $\frac{4.5}{100}$ liter. For additions are usually prescribed: roast, 175 gr.; potatoes, 400 gr.; cocoa, milk, eggs, etc.; sausage, 60 gr.

Certain hospitals occasionally prescribe, besides the meat in the second form, roast beef, raw beefsteak, and broth, in all 700 gr. meat. Strictest economy is exercised in the prescription of eggs, as well as of cocoa, wine, etc. All German military hospitals are on a prohibition basis; no alcoholic drinks are served except on order of the physician.

The serving of these diets, owing to the lack of help and equipment, is carried out in the simplest possible way. The food is carried about in pails and pans to the bed-ridden patients and those up and about help themselves. Each patient has a large bowl holding about 2 liters for the stews, broths, gruels, etc., and has a knife, fork, cup, and spoon; no plates are furnished. Friends or relatives who are able to send extra foods may do so if permitted by the doctor. The enlisted personnel receive the regular army ration, but, as with all medical corps, enlisted men attached to hospitals manage to subsist very well.

The following list of drugs and medicines is all that has been found necessary in the German army during peace, and it has not been added to in the war, except to include new and approved remedies, such as Dakin's solution, recommended by an American, and new immunizing agents.

PRUSSIAN MEDICINE SUPPLY TABLE IN PEACE AND WAR FOR FIELD, EVACUATION AND BASE HOSPITALS.

(No other Supplies are Issued.)

Acid, acetic. dil.	Calcaria chlorata.
acetyl. salcyl.	usta.
tabl., 0.5.	Calcium carbonicum.
benzoic.	sulfuricum ustum.
boric. plv.	Camphor.
carbol, liquefact.	Charta sinapisata.
chromic.	Chinin. hydrochlor.
citric. plv.	hydrochlor. tabl., 0.3.
diethylbarbitur., 0.3	Chloroform.
hydrochlor.	Choralhydrat.
nitric.	Chrysarobin.
salicyl.	Cocain. mur.
sulfuric.	Codein. phosphor.
dil.	Collodium.
tannic.	Cortex Chinæ conc.
in tabl., 0.6.	Cupr. sulfuric.
tartaric, 0.75.	Dakins-Lösung.
Adeps. lanæ anhydricus.	Empl. adhæsiv.
lanæ c. aqua.	cerussæ.
suillus (nicht vorhanden).	lythargyr.
Æther pro narcos.	Extractum belladonna.
Æthylchlorid.	filicis æthereum.
Alumen. plv.	gentian.
Ammon. bromat.	hyoscyam.
chlorat.	secal. cornut. fluid.
Amyl. tritr.	Ferr. oxyd. sacch.
Apomorphinum. mur.	Flor. chamomill.
Aqua amygdalar. am.	fol. digital. conc.
calcaris.	menth. pip. tabl. a., 2 gr.
destillata.	Fol. sennæ concisa.
Argent. nitric.	uvæ ursi concisa.
Atropin. sulfur.	Formaldehyd. sol.
Balsamum copaivæ.	Fuchsin.
Peruvian.	Glycerin.
Benzin petrolei.	Gummiarabicum. plv.
Bismut. subnitr.	Hexamethylentetraminum plv.
Borax plv.	c. tabl., 0.5.

Hydrargyr. bichlorat.
 bichlorat. tabl., 0.5.
 chlorat. plv.
 tabl., 0.2.
 oxydatum.
 præc. alb.

Jodoformium.
 Jodum.

Kal. bromat plv.
 carbonic.
 caust. fus.
 chloric.
 jodat.
 permang.
 phosphor.

Kreosot.

Liniment. ammon.

Liquor. alumin. acet.
 ammon. anis.
 caust.

creosoli saponatus.
 ferri sesquichlorati.
 kal. acetici.
 natr. silicici.
 plumb. subacetici.

Lycopodium.

Magnesia sulfuricum.
 usta.

Morph. mur.
 mur. in tabl., 0.01.

Mucilag. gum. arab.

Natr. bicarbon.
 tabl. a 1.0.

bromat.
 carbonic.
 crud. tabl. a 1.0.
 chlorat.
 phosphor.
 sulfuric. sicc.
 thiosulfuric.

Oblaten.

Oleum anis.
 cacao.
 camphor. fort.

Oleum jecor. aselli.
 lini.
 menth. pip.

olivar.
 papaveris.

ricin.
 sinapis.
 terebinth.

Opium plv.

Paraffin, liquid.

Pepsin.

Phenacetin.

Placent. sem. lini.

Plumb. acet.

Pulv. ipecac. opiat. tabl., 0.3.
 stibiat. tabl., 0.65.

liquirit. compositus.
 salicyl cum talgo.

Pyrazol. phenyldimethylicum.
 salicyl.
 tabl., 0.5.

Rad. althææ conc.
 colomb. conc.
 ipecac. conc.
 plv.

liquirit. plv.
 rhei. conc.

plv.
 in tabl., 0.5.

sarsaparillæ.

seneg. conc.

valerian. conc.

Sacchar.

lact.

Sal. carol. fact.

Sebum salicylatum in Blehschach-
 teln.

Sirup simpl.

Species pectorales.

Spiritus.

ætheris.

camphor (nicht vorhanden).

saponatus.

sinapis.

Strychnin. nitricum.
Succ. liquir. depuratus.
plv.

Tablett. anæstheticæ.
solvent.

Tartar. stibiat.

Tinct. amara.
aromatica.
Chinæ cps.

digital.

jodi.

myrrhæ.

opii. benz.

simpl.

strych.

val. æth.

Ungt. diachylon.

formaldehyd 1 dozen.

hydrargyr. ciner.

1 globul.

1 globul. a 2 gr.

kal. jodat.

paraffin.

plumb.

zinci.

Vin. camphor.

Zinc. clorat.

oxydal. crud.

sulfuric.

Nachtrag.

Choleraimpfstoff.

Digipurat-Tabletten.

Lösung a 10 c.cm. zum Ein-
nehmen.

ampullen.

Diphtherie serum 1500 I E.

Ersatz für benzin.

Hydrogen. peroxydat.

Meningokokken serum.

Ol. arachidis.

Phenolphthalein in tabl., 0.1.

Pockenlymphe.

Pyramidon ersatz in tabl., 0.2.

Salvarsan. neo., 0.3, 0.6.

Streptokokkenserum.

Tetanus antitoxin serum.

Tetrachorkohlenstoff als.

Typhusimpfstoff.

SUBSTITUTES.—Many things thought necessary in the line of hospital supplies are either very limited or have not been available in Germany for some time: such as gauze, cotton, adhesive plaster, rubber goods, petroleum, benzin, vaselines and oils of all kinds, carbolic acid, etc. The result has been a stimulation of inventive ingenuity, and many very good substitutes have been devised. For cotton, a "Zellstoff," or wood fiber cotton in sheets, is made that is as useful in every way as cotton, is very cheap, and can be cleansed and reesterilized if not too badly soiled; this allows of an enormous saving in gauze, as only two layers, to cover and hold the wood cotton in place, are necessary. Here comes into general use, to fix the gauze edges beyond the cotton dressing to the skin, the substitute for adhesive

plaster. This is called "Mastisol," and was a proprietary preparation; it is the most useful thing ever discovered for surgical dressings; it is like mucilage, and is painted on the skin with a feather or brush a few inches beyond the completed surgical dressing, over which is spread a couple of thicknesses of gauze cut to extend to the same extent beyond the dressing, so that its margin lies on the mastisol-painted zone which soon dries and sticks the gauze firmly to the skin. A bandage may or may not be applied over all, as indicated. This mastisol produces a very firm adhesion, never irritates the skin, can be reinforced by a nurse if it should come loose, is cheap, and takes the place of the expensive adhesive plaster under all circumstances; it is very useful in arranging extensions through gauze tractors, for minor dressings, ~~takes~~ the place of pins, etc.; is very easily removed, leaving ~~only~~ a few dry white scales on the skin. Its composition ~~varies~~ somewhat; it is supplied in $\frac{1}{2}$ -liter bottles by supply depots, but can easily be made in any hospital. The formula in ~~one~~ hospital was as follows: Mastic (grams 20), benzol (grams 50), and linseed oil (drops 20).

No practical substitute for rubber drains, gloves, etc., has been found, and the lack of oils or anything containing animal or vegetable fat is trying at times for one used to everything that money can buy. The Germans have found substitutes for almost everything, however, and one soon learns that, after all, simplest methods are best in medicine and surgery as well as in other professions. The lack of certain medical supplies due to the blockade developed the fact that the German people and the medical profession as well are great patrons of patent medicines. A pamphlet was published by Dr. Bachem, of Bonn, giving a list and the method of preparation of seventy-five substitutes for proprietary nostrums from all countries.

REPORTS.—There are very few regular written reports on the professional work required in these hospitals; the monthly

report of the administrator to the chief surgeon of the garrison is supposed sufficiently to consolidate matters of interest from all departments. The lack of a daily morning report was felt by one American relief worker who had had some military experience in the United States army, and he adapted one to the German hospital system that was based on the United States army daily morning report of sick and wounded. The separate reports from each ward, consolidated in the record office early every morning and posted in the various offices, were evidently appreciated, as the system was adopted generally in that army corps.



FIG. 57.—Convalescents in gardens in connection with base hospitals.

ENTERTAINMENT OF PATIENTS.—Considerable time and thought is paid to the entertainment of patients in hospitals on account of the evident improvement it effects in their condition in every way. There is something going on almost daily in the way of visits to the moving-picture shows, etc., for those who can march, walks in groups under a non-commissioned officer, in fair weather, steamboat and railroad excursions, with picnic features in summer. Indoors are

given concerts which at times are rendered by musicians of national and international reputation; amateur theatricals, sleight-of-hand work, children's entertainments, war weddings and funerals. The highest officials and their wives make it a point to be present whenever possible and take



FIG. 58.—Corner of a 54-bed surgical ward in a branch base hospital, showing iron beds with hair mattress; the garments hanging on the upright rod at head of bed are long, heavy, lined or padded double-breasted ward gowns or coats. On this rod over each bed is the 25 cm. square blackboard of metal, on which are chalked the name, age, civil status, military rank, date of entrance, date of wound, diagnosis, date of operations and diet.

occasion to mingle freely and converse with the soldiers when occasion offers. On a steamboat excursion on the Rhine for convalescents it was noted that a large committee of the leading women of the province and their daughters went on every trip and personally waited on the men and

entered freely into conversation with them with no constraint or trace of conventionality. Expressions of sympathy were avoided and everything for the helpless cases was done tactfully, naturally and cheerfully. It is now a national game in psychology that all classes are playing under the instructions of the medical faculty. A good band always accompanies the excursions, the men are encouraged to sing and everybody joins in choruses; some simple refreshment is



FIG. 59.—Convalescents at setting-up exercises in base hospital. These men are wearing the heavy hospital coats so useful in cold weather.

passed every hour, such as a cigar, some cigarettes, hot broth and a piece of bread with marmalade, substitute coffee, flowers; at a regular meal time, tea and more substantial food is served; the band plays all the while. Stops are made to buy fresh fruits, etc., or all will land for lunch or a view. All the service is by the ladies. The improvement in all those participating is very marked and lasts many days. As many of the hospital personnel as can be spared

are encouraged to accompany these outings, for they often need the change as much as do the patients.

As soon as patients are able, if the doctor consents, they are formed in classes and receive daily special setting-up exercises under a non-commissioned sanitary officer. This materially shortens the convalescent period. Military jurisdiction over a disabled soldier never ceases until he has been discharged from one of the military hospital-schools as competent to return to duty or to earn his living. Each military district publishes a hospital newspaper or bulletin filled with instructive and stimulating information for injured men and advertisements for help in all the trades and occupations. These are answered through the paper, which has a consolidated report of all the lists of help wanted in the country and it is the business of a special committee to attend to each individual need. (See Fig. 59.)

SOME MEDICAL AND SURGICAL ASPECTS OF WAR.

No attempt will be made to describe the professional work except in a very superficial manner.

IMMUNITY MEASURES.—In these times of the blessings of immunity measures in preventing disease the medical side of military work is overshadowed by the surgical. All of the troops when recruited are immunized against typhoid and paratyphoid fever and vaccinated against smallpox. Shell wounds, especially those caused by fragments which have first struck the earth, call for the immediate serum injections for tetanus in one breast and for gas gangrene in the other given at the same time. The nature and technic of the latter have not yet been published, but there is now practically no tetanus and no gas gangrene among the injured in the German army. Cholera is now absolutely under control by prophylactic injection.

FEVERS.—Malaria, which before the war was infrequent in Germany, is increasing on some fronts, and, according to Professor His, it is expected to increase after the war. So far it is all of the tertian type and becomes very latent; there may be no symptoms for long periods, but the plasmodia can be found in the blood at almost any time. A new fever has recently been discovered by a pupil of His, which they have named "Volhynian Fever" (trench fever); it has five-day periods, lasts for many weeks, and is not

related to malaria. "Rheumatism" is said to be common, with the usual complications, with one notable exception, pericarditis, which, while common in peace, is very rarely encountered. Typhus fever is avoided by elaborate methods of destroying the lice by disinfection and by rigid attention to general and personal hygienic measures. Large plants and also trains are established solely for the purpose of "Entläusung" or "unlicing" of the troops. Shaving the head for this purpose resulted in such convenience and comfort that many men and officers now clip or shave their heads regularly. The treatment of typhoid fever by vaccine inoculations has been very satisfactory. In Lille an epidemic of typhoid occurred in 1915-16 from an infected water supply and 16 per cent. of the cases in the civil population died, but among the 600 cases in the soldiers there were no fatalities. A five-day typhoid was noticed in this epidemic after beginning the therapeutic injections. Five injections were found sufficient, and among the civil cases under treatment the mortality lessened with each injection.

GAS GANGRENE.—Gas-bacillus infections are best treated by very free, long, and deep incisions to relieve all pressure, and should be followed by the Dakin treatment; in foudroyant cases a guillotine or circular amputation must be quickly made, and as soon as the vessels are tied the dressing is loosely applied; the whole procedure should not take more than five minutes. Baron Larrey used to make them in 15 seconds. If the wound is sewed up the gangrene will persist and the patient will die. Many cases are called gas gangrene that are not. Localized gas gangrene that develops slowly around a buried missile or other foreign body can be detected by the x-rays, and is usually cured by simple free incision and drainage. Infantry rifle bullets never seem to cause it, only shrapnel splinters that have scooped up some dirt before penetrating. Outbreaks of gas gangrene cases seem to be periodical and are so far inexplicable except that wet weather

seems to favor them. There are several kinds of cases: (1) due to the Welch bacillus, with pink or salmon-colored muscle tissues and a pink discharge; (2) due to the *Bacillus capsulatus aërogenes*; (3) due to a coccus; (4) due to a colon-like bacillus. All produce a soft brownish, stinking, clay-like tissue with a fecal odor. Treatment is by thorough removal.

WOUND INFECTIONS.—Nearly all war injuries become infected, have the usual complications of secondary hemorrhages, etc., and the one great problem in this line for war surgeons, which is still only partially solved, is to begin effective measures to combat the infection while the patient is on his way to the first line of hospitals or aid stations. Drenching the wounds with tincture of iodine or any other standard antiseptic is useless. Anyone who has received hospital trainloads of men severely wounded a few days previously, all of whom have had their wounds treated on the field by iodine or by any other antiseptic, can testify that more dreadful conditions of wound infection cannot well be imagined. The Dakin solution and technic of treatment by Carrel, which needs no description here, is the greatest surgical discovery in connection with the therapy of infections, and is still in process of evolution, but up to the present time the patient must go to the special hospital for its application instead of having the treatment come to him on the field or as immediately as possible after receiving his wound. Bacteria do not appear in war wounds until eight to ten hours, but by the time a badly wounded man reaches a base hospital the infectious process is usually in full swing. An interesting report in the November, 1916, issue of the "*Kriegschirurgische Hefte*," by Wm. Mueller, shows a method of treatment similar to Dakin's which, if successful, might be applicable at a first-aid station and prevent or retard the development of severe infections. Mueller was chief surgeon of a hospital in the Balkans and reported wonderful results in 327 cases of the severest types

of wound infection. He called it in his article "A 'New' Method of Treating Severely Infected Wounds without the Use of Cotton." The idea was of course from Dakin and Carrel but the preparation of the solution used is interesting. It is made by dissolving one kilogram of "Kalk" (chloride of calcium) in 8 liters of water; it is then boiled, let stand ten to twelve hours till settled and the clear fluid



FIG. 60

portion run through filter paper. This process furnishes about 4 liters of the fluid. The wounds are bathed with the fluid daily for about one-quarter of an hour; deep wounds are freely irrigated under pressure with the solution in irrigators hung two or three meters high, the finger assisting the tube to hunt out all the recesses; tubes and gauze lightly packed are left in the wound depths and over all he then places large ordinary sponges saturated with the solution

which are covered with oiled silk and held in place by a bandage. Every two hours the sponges are squeezed through the dressing in order to drench the wound surfaces. The sponges are boiled daily. Mueller put his infected compound fractures in provisional splints during the treatment, which, he says, changed the sloughing wound surfaces to healthy granulations in about one week. Anyone who has given the Dakin method a fair trial knows that it is the greatest discovery for very severe wound infections ever made and that its value can hardly be estimated, yet there are many, too many, wilful members of the medical profession in the armies of Europe who refuse to have anything to do with it. The German surgeons are adopting it and get splendid results. Winklemann, of Barmen, 1916, reported most brilliant results in 1000 severe cases. There is no doubt, however, that a large number of cases treated by this method would do as well under other methods, and as the present technic is so elaborate it is applicable only by skilled men. Other than the Dakin solution all irrigations and wet dressings are useless except probably a saturated solution of commercial acetate of aluminum, which is highly germicidal, non-toxic, actually saturates infected tissues, is cheap and easily prepared. An immensely important part of the treatment, which is not enough emphasized, is to build up the patient's resistance by internal therapy and by intensive attention to the dietary, which should have a large content of sugar, especially during convalescence.

Excision of surfaces of freshly infected wounds, with sutures to be tied secondarily, in cases which need exposure of the wound to sun and air for a few days, has given excellent results. Drains which adhere to the wound surfaces should never be used.

FRACTURES.—The large number of compound infected fractures of the long bones, often complicating a joint, present the most difficult mechanical surgical problems of the war

and should be handled from the time of arrival at the first-aid station by persons with special inclination, ingenuity and patience for this kind of work. Many very practical apparatus which fulfil the indications have been evolved by German surgeons for the transportation of and for the complete treatment of compound fractures, but as a general thing they are, especially for the upper extremity, too heavy and do not give proper access to the wound for the daily treatment necessary to establish secondary asepsis without carrying the patient to and from the dressing rooms. The most perfect apparatus are those in use in France, many of which were devised by Miss Grace Gassette. A great many of the splints for the body and lower limbs are based on the principles of the splints, without some of their good features, devised by Dr. Wm. P. Verity, of Chicago, in 1880-1885. In the absence of special splints, plaster of Paris reinforced or interrupted by metal bands is still the most satisfactory all-around material for both temporary and permanent rigid dressings. A good general rule is to discard most of the plaster casts after the patient reaches the base hospital. All plaster casts, however, should be cut through from end to end as soon as they harden, or before the patient leaves the operating room, if possible, to prevent harmful pressure. The most urgent present need in all the armies to insure proper transportation of fracture cases is standard immobilizing splints for both the upper and the lower extremities, to be applied at the first-aid stations.

INFECTED JOINTS.—The most difficult drainage problems are connected with infected knee- and elbow-joints, but as ankylosis always follows, the joints can be laid as widely open as necessary without regard to future function. The important thing to bear in mind is to dress the limb at such an angle that it will ankylose in the most serviceable position. Much bad surgery is evident in finger-, elbow- and knee-joint ankylosis with the finger and limbs in a perfectly straight and

almost useless position. Arthroplasty will find an immense field in the chronic surgery of war cripples and the principles and practices of Murphy and Payor can be fully tested. These are operations, however, only to be undertaken by specially trained men, in special departments of hospitals. In many war ankylosis cases the soft parts and integument about the joints have been destroyed and replaced by cicatricial tissue to an extent that will preclude the possibility of successful arthroplasty.

AMPUTATIONS.—Amputations are altogether too frequent and continue to be a reproach to surgery. Conservatism can be practised without prejudice against necessary amputation, but a consultation should always be had in cases involving any doubt. The aperiosteal method, saving every fraction of every inch, retraction of nerves inside their sheaths by stripping back the nerve coverings before dividing the nerve, few sutures, energetic early after-treatment by massage and pounding to toughen the stump, and getting the man out of bed as soon as practicable, is the best general technic.

1. Of greatest importance for function after an amputation is the attainment of a good, direct weight-bearing stump; above all is this the case in the lower extremity. Protheses made for direct pressure are to be decidedly preferred to others.

2. An exception from direct pressure may be made temporarily to carry out an extension of the skin and soft parts in patients whose general condition makes it imperative that they be gotten out of bed.

3. Weight-bearing ability of the stump is attained on the one hand through the amputation method itself, the aperiosteal method of Bunge, and on the other hand and most especially through the after-treatment, energetically carried out, of Hirsch—pounding massage.

4. As amputations following war wounds hardly ever heal

per primam, there occurs through the long-continued suppuration on most of the stumps, excessive callus development or small sequesters.

The callus development due to the early treatment, after Hirsch, has never unfavorably influenced the weight-bearing ability of the stump; one sees in the *x*-ray pictures, instead of the former often irregular outlines, a more even bone development, because the callus spreads out less distally than in the amputation level and later is spontaneously absorbed.

The small sequesters on the sawed surfaces are partly absorbed or are easily thrown off and have in no case made a reamputation necessary or interfered with the direct pressure-bearing ability of the stump.

5. Especial stress is laid upon the value of the systematic after-treatment, massage, pounding and walking on it; early getting out of bed and also the beginning of the after-treatment at a time when the wound is not yet closed. Mobilization of adjacent joints is attained and atrophy of the stump avoided by passive exercise and massage, which are secondary in importance to the active, voluntary movements.

6. According to war experience, it seems that Bier's opinion that the soft parts of the wound have only a subordinate role in the weight-bearing, is confirmed. The flap methods, the circular cuts and the complete open method have, under appropriate treatment, secured scars that do not disturb the direct pressure use of the stump.

7. Wounds left wide open for severe suppuration and cases of circular amputation, without flaps, received from the field with far-retracted soft parts, achieved most excellent and useful results with extension in bed and immediate prothesis.

8. With the possibility of proper after-treatment, linear amputations are inadvisable in the home hospitals.

The use of a cheap, immediate, indirect pressure prothesis

usually leads to a good stump for direct pressure and is an excellent early schooling for patients in the use of artificial limbs, and what is also important, renders the amputation cripples psychically and physically sooner capable of work.

Reamputations for protruding bone, etc., which are frequently necessary, rarely need be made through fresh tissues with the knife; the bone can be bared sufficiently for sawing as high up as needful by forcing the soft tissues back, making a practically bloodless operation. When flaps of the soft parts are required on account of retraction and unhealthy and excessive granulations and scar tissue covering the end of the stump, the line of cleavage between skin, subcutaneous tissues and musculature is readily found and allows of rapid and easy peeling back to the desired extent; the other soft tissues of the stump can be divided vertically along the fascial planes to give access to the bone at the point it is desired to divide it and again a practically bloodless amputation can be effected without fresh section of the vessels and nerves of the limb. When the skin has retracted even to an extent which leaves the entire stump bare, the wonderful elasticity of the skin is such that it often can be drawn down by gradual extension until it completely covers the stump.

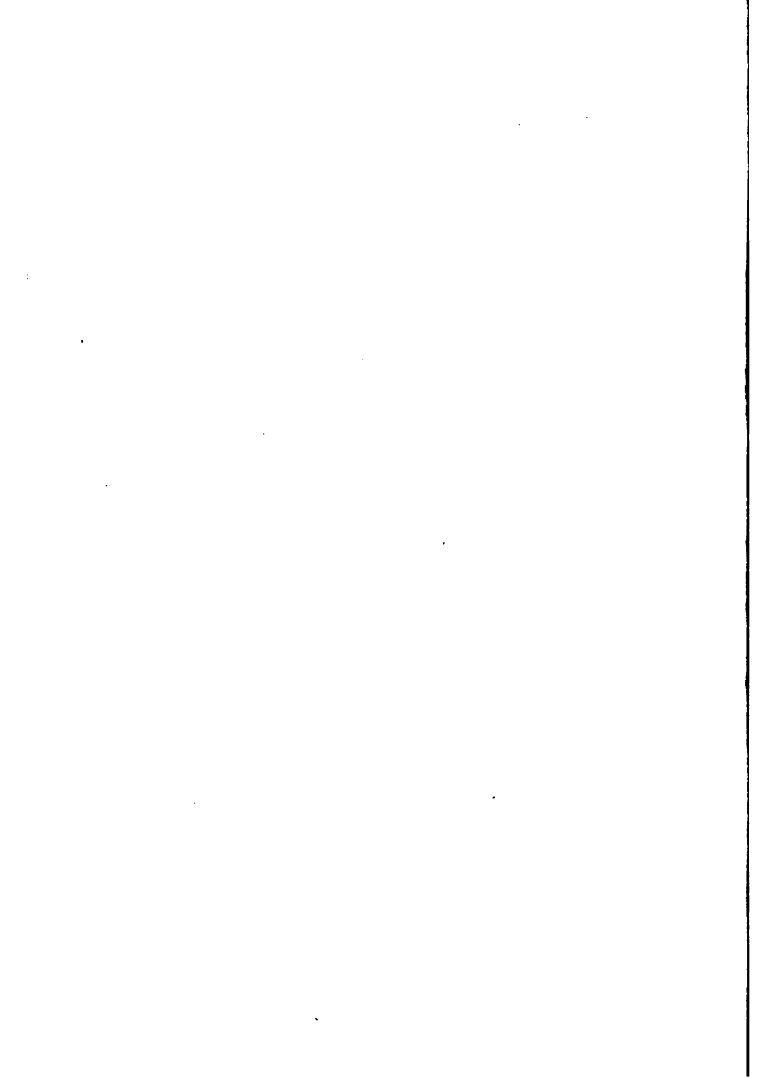
SEQUESTERS AND FISTULAS. — Fistulas due to sequestrers and to foreign bodies fill many thousands of war hospital beds for an unnecessarily long time. Spontaneous extrusion should not be waited for; sequestrers should be removed by operation and by the simplest methods. If the removal is not complete at the first operation, a second or third operation may be necessary. Only when the x-rays show no more sequestration may the wound be allowed to heal. In every operation the cavity's lining membrane of granulations must be respected and whenever possible be left uninjured. Under these conditions the fistulas heal faster and more surely and a further plastic operation on the bone cavity will not be necessary. Many chronic fistulas

were found to have silk ligatures at their bottom and the amount of disability and non-effectiveness from this source should forever debar the use of silk or other non-absorbable material for buried sutures in military surgery; all silk should be dyed black so that, if no other material is available, it can be easily found and removed. The large majority of sequesters or foreign bodies at the bottom of fistulas can be reached by dilating along the fistulous track, chiselling through bone where necessary, and removed with very little use of the knife.

REMOVAL OF FOREIGN BODIES.—Removal of bullets, shell fragments and other foreign bodies consume about half of the time of the average war hospital's operating room, and although their extraction is usually simple enough, there are enough of them that baffle the best surgeons to lend an air of uncertainty and interest to this part of the work. It is the policy of the German government to have all buried missiles or other foreign bodies removed whether they cause symptoms or any disability or not, on the ground that the psychology of the condition is disturbing to the host as long as he harbors anything in his body that does not belong there.

Every kind, size and shape of metal, cloth and wood particles in any number are buried in the body during fighting; many often become encapsulated and give rise to no symptoms. All metallic objects are easily located for general position by the fluoroscope and then their exact depth to a millimeter from the nearest surface point can be determined by *x-ray* photography and described for the guidance of the operator, on a card which states that "so and so many millimeters under the spot in the small circle," which are made with silver nitrate, "lies the object." When this determination of the depth of the foreign body is carefully done, it is very accurate, and even if it takes the surgeon some time to locate it, he will find that it was at the depth stated. With





this help some foreign bodies may not be found and if they are not of brass, lead or aluminum, the vibrating electro-magnet, first used in France, is a great aid by causing the object to move in response to the interruptions of the current and thus guide the surgeon's finger to its hiding place. Another apparatus was recently designed that is said to be of very great assistance in locating foreign bodies by photographing them in perspective so that the picture is very plastic and shows the surgeon the exact relation of the bullet to the neighboring anatomical structures. Some of these bodies are so firmly encapsulated that they must be patiently dug out. The use of the large electro-magnets, similar to those employed in removing metal from the chambers of the eye, has not proven satisfactory, except in a few cases of superficially located metallic bodies in the brain. X-ray tables in the operating room and a camera-lucida arrangement whereby one eye of the operator is free and the other looks through a fluoroscopic attachment, is one of the very numerous contrivances for hunting the foreign body. The surgeon who gets the most foreign bodies and gets them quickest is the one with a good tactus eruditus. The presence of bits of wood or clothing are usually suspected from clinical symptoms of persistent suppuration. Next to a military order or medal the soldier prizes the bullets and other hardware that have been shot into his anatomy, and they are all demanded and turned over to him as his private property.

There are many curiosities in penetrating missile surgery. One of the most interesting (see Part II) was a long French infantry rifle bullet lying loose in the medullary cavity of the tibia, without any fracture of the bone. Another case was that of an officer who, while charging on a run with the knee raised and flexed, received at 300 meters through the center of his right patella an infantry bullet which passed out in the center of the popliteal space behind; he was in hospital but three

weeks and returned to duty at the front with only a temporary slight limp. Bullets frequently become embedded in small bones, like the patella and bones of the foot, without causing any fracture. One patient of Ellermann's, who was shot in the back some months before and returned to the front soon thereafter, complained of persistent severe headaches; no x-ray being available, Ellermann cut down on the wound of entrance and found a mass on the spinal column in which was buried a long-pointed bullet. Extraction was followed by a gush of cerebrospinal fluid, evidently under pressure. Complete and immediate recovery from the head symptoms followed. Wounds of entrance over the heart with exit in the back opposite without important symptoms are not uncommon. Several bullets were found encapsulated in and under the tongue. There is probably no region of the body in this war that has not become a resting place for a bullet or piece of shell. In some instances hundreds of minute particles are dusted thickly through the tissues, which cannot be removed and which usually cause no symptoms.

BURNS.—Burns should all be treated with the paraffin method, which is a veritable surgical blessing for these distressing cases. The cases that require extensive skin-grafting can usually borrow any extra skin needed from comrades during their anesthesia when being operated upon for any reason.

INJURIES OF THE HEAD.—Injuries of the head, penetrating to the brain and meninges, have a mortality of 20 to 30 per cent. from infectious meningitis, cerebral hernia and abscesses are common and are treated by short drains (see Figs. 61 to 65). Foreign bodies, if deep, are left in. The late results of this class of cases are surprisingly good and there are very few insane, as popularly supposed, from brain injuries. Operative treatment is not advisable in the zone of the advance. The technic of closure of skull defects after complete healing has occurred is simple and very satisfactory as

practised by some of the German surgeons. The skull defect is encircled with the knife and all cicatricial tissue carefully dissected out, including the coverings of the brain if adherent; the skin over the thigh is then opened and a flap of subcutaneous fascia and fat large enough to fill in the defect is removed and placed in the opening over the exposed brain, where it acts as a styptic; next, the

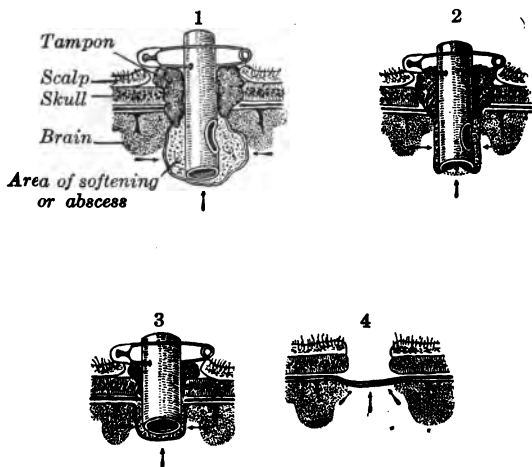


FIG. 61

anterior inner aspect of the tibia is exposed and with a chisel the width of the surface of the bone, a chip about one-eighth inch thick and large enough to bridge the defect is quickly cut, using a heavy mallet; the chip curls up but it can be straightened by the fingers and its edges trimmed so that it somewhat overlaps the bony edges of the skull opening; the scalp is then mobilized and sutured over all without

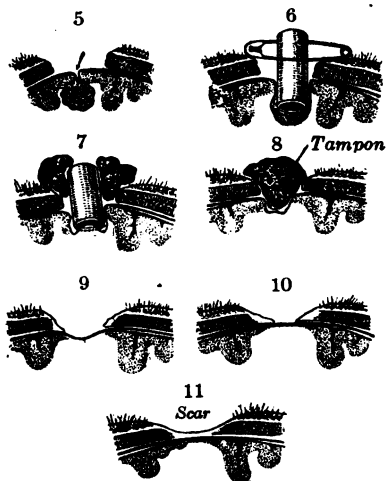
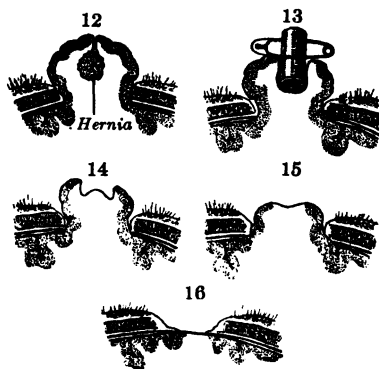
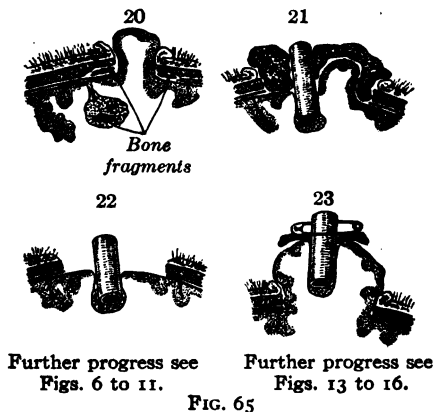
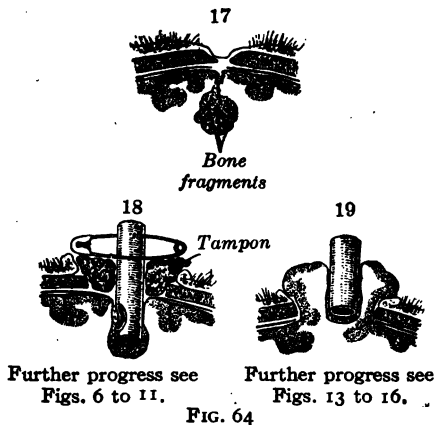


FIG. 62



Further progress see Figs. 10 and 11.

FIG. 63



FIGS. 61 to 65.—Operative treatment of gunshot wounds of the brain, by Dr. Müller. (From von Bruns's *Kriegschirurgische Hefte der Beiträge zur klinischen Chirurgie*, Band c, Heft 1, 1916.)

drainage. If the skull defect is too large for a tibial transplant, a piece from the scapula is used. The operations do not take much time in skilful hands and I have seen four done in two hours. Hemiplegic conditions begin to clear up in a short time and in a few months most of the cases are in a satisfactory condition.



FIG. 66.—Result of downward force of high-explosive shell fire.

INJURIES OF THE NECK.—Injuries of the neck are not serious unless the thyroid and the large vessels or veins are injured. Wounds of the trachea all heal readily.

WOUNDS OF THE CHEST.—Chest wounds are common and of all kinds. Many develop empyemas but in general the mortality of chest wounds is low. Morphin, closure of wound when possible and absolute rest to prevent hemor-



FIG. 67.—Shell-shock kyphosis. (Heubach.) Personal communication.

rhage for two or three days before moving the patient are indicated; later drainage by rib resection when necessary; Baron Larrey's treatment in the Napoleonic wars has not been greatly improved on today.

ABDOMINAL WOUNDS.—Acute surgery of the abdomen from gunshot wounds does not differ from that in civil practice



FIG. 68.—Result of downward force of high-explosive shell fire.

and is treated in the field hospitals. After-results in intestinal obstruction, from adhesions, are encountered later in the base hospitals.

WOUNDS OF THE BUTTOCKS.—Wounds of the buttocks are serious and sometimes hard to manage on account of their proximity to the rectal discharges and the liability to gas



FIG. 69.—Shell-shock kyphosis. Plaster correction after Culor Heubach. Personal communication.

and other infections. Davis and others have written special articles on this subject and in some cases advocate inguinal colostomy to interrupt the fecal current until wound healing has occurred.

Many old friends of civil surgery will be met, especially in the garrison base hospitals, such as appendicitis, hernias, varicoceles, hydroceles, piles, varices of legs, surgical tuberculosis, stomach and gall-bladder disease.

Experienced military surgeons have often noted that whenever troops take the field they immediately furnish a surprisingly large number of cases of acute and recurrent appendicitis which usually begins suddenly and rapidly develops the symptoms in their classical order.

HERNIA AND OTHER CHRONIC SURGERY.—Hernia is still a subject for discussion in Europe. The ancient Bassini operation is preferred in Germany and high officers once advocated the use of a truss and returning the man to the trenches, so anxious were they for more men. Criticism was made through official channels of the economic and military fallacy of old types of operations and of sending men to the trenches wearing trusses for hernia, which was acted upon favorably and made the subject of a general order.

Surgery of the peripheral nerves and bloodvessels furnishes a larger field than ever before and should be undertaken only by specially qualified men.

SHOCK.—Shock is a frequent complication in this war and its effects are often noted long afterward. Shock from exposure is frequent; some men have lain six days in "no-man's land" before getting to a hospital, during which time many have been secondarily wounded. Morphin, warmth and stimulants are freely used to overcome this condition before undertaking serious surgical procedures. A new form of shock causing immediate kyphosis is observed, which may be described as shell-shock kyphosis, due to the downward pressure of a bursting charge of high explosive immediately over the man (Figs. 66 to 69). It seems to be an impaction of the vertebræ locking the spine forward, but Professor His believes that it may be due, in part at least, to some traumatic nervous condition.

The shell shock of men with a neuropathic tendency is a long chapter, the lesson of which is that an ounce of prevention is worth a pound of cure. Unless the mentally unstable are weeded out before "going across" the American army will fail to profit by one of the grievous lessons of all the armies of Europe.

DENTAL PROTECTION.—According to Professor Dr. W. Dieck, of Berlin, dental diseases are alarmingly prevalent among the German people. Statistical investigation has proved that only 2 or 3 per cent. of school children have sound teeth. Investigations among soldiers have shown similar results. How can the dental care of an army of millions be successfully accomplished in a country where the profession of dentistry is so backward? Many army corps have in time of peace special dental stations where the soldier is given aid and treatment; and wherever such dental stations are lacking, private dentists are appointed to look after their welfare.

At the beginning of this war the dental care became more complicated. Every man had to be examined and either recommended for service or treatment. This added enormously to the responsibility and activity of the dentists appointed by the military medical board. Many cases required prolonged treatment, and although preservation of affected teeth should be the fundamental object, this must be restricted in time of war, and the preference must often be given to the extraction of diseased teeth. It is perfectly justifiable and advisable that before entering the army or navy all broken teeth or roots be removed from the gums, even if they cause no discomfort. Such roots and their surrounding bone substance are in the majority of cases not free from germs and decay, and are the cause of abscesses, inflammation of the tissues and general infection elsewhere. Frequently the gums and jaws are diseased and form regular breeding places of disease germs which may be in a quiescent

state for years and some day break out upon the first irritation. A man suffering with inflammation of the jaw is not much better than a wounded soldier; and it should be remembered that with every injury to the jaw the germs present in the diseased part heighten the danger of infection, local and general.

Dr. Dieck suggests that better preparation could be made for a war of the future in regard to dental care if the necessity of dental sanitation among German school children gradually penetrates through the people, and if communal as well as governmental authorities will give more efficient aid in this direction.

The importance of early or preventive treatment cannot be emphasized enough. A scheduled care of the teeth on the battlefield is seldom possible even to those who were accustomed to it. It can also be understood that soldiers in active service look at tooth sanitation as a matter of minor importance, unless they actually suffer with a toothache.

Besides the treatment for dental diseases and its consequences, the army dentist has other duties; the most important is that of treatment, in connection with a skilled surgeon, of injuries of the jaw.

With the fighting methods of today the number of such injuries is ever on the increase. The numerous cases of jaw injury and their treatment have proven that the trained assistance of the dentist is a necessity and it has been provided for. Even after the war of 1870-1871 the surgeon-general, Dr. von Langenbeck, made the statement: "I should not care to go through another campaign without having obtained competent technical assistance for those who have sustained injury of the face and fractured jaws."

In the case of jaw fracture the technical knowledge of today permits a speedy reunion and replacement of the fractured parts to their normal position, and makes the

early resumption of mastication possible without disturbing or interfering with the healing process. If parts of the bone structure have been destroyed, plastic and dental surgery come to the rescue with transplants or artificial substitutes, not only to prevent disfigurement, but also to make mastication possible.

In a cosmetic respect much can be done, when as the result of scar shrinkage after serious injury to the soft parts, or after loss of supporting bone substance, deformities of the face have appeared. Gradual stretching of the scar tissue, artificial substitutes for the missing bone, and plastic skin operations frequently bring about surprising results. Dental technic and plastic surgery go hand in hand to relieve soldiers of war's injuries or at least to greatly diminish their disabilities.

Dental care for the war in Germany is at the present time provided for in the following manner:

1. Several army dentists with complete outfits are a part of the sanitary division of every army corps. According to the sanitary regulations they are intended for the field hospitals belonging to the line of communications, but when necessary can be called to the place of action and the emergency stations.

2. Dentists of the reserve hospitals in the homeland must in the first place treat soldiers who suffer with dental disorders, and secondly, such as are suffering from injury to the jaw. Some reserve hospitals are intended entirely for jaw injuries, as for instance those in Berlin, Duesseldorf, Straszburg and Heidelberg.

3. Civil dentists are, by contract or voluntarily, active in hospitals of the Red Cross, and emergency hospitals and trains, or in certain private localities.

As a result of this war the much-mooted question of introducing the military dentist will gain new interest in the future.

CHARACTER OF SURGICAL WORK IN GERMANY.—In general the quality of surgical work seen in German war hospitals was not as good as one had a right to expect. Better practical standardization of both hospital service and in the practice of clinical surgery would enable them to extend the work of their small groups of very competent surgeons to a far greater extent. No finer work can be found anywhere than in the institutions under the real surgeons, but in the great majority of them there is far more evidence of the work of the occasional operator than of surgeons. Germany, with only 40,000 physicians, was unable to properly staff her military medical department to meet the full demands of the great war and the available competent men have not yet been made use of in the most efficient way. A shockingly large percentage of cases of chronic or clean surgery badly infected or with bad results otherwise came under our notice in some districts. The overwhelming amount of work suddenly thrown upon the understaffed department may have been some extenuation in the first year, but to continue to allow men who were never trained in surgery to operate on chronic cases, the cases that are not urgent, when many lines of communication and home base hospitals are perfectly equipped and in charge of excellent surgeons, is not to be condoned.

NECESSITY OF STANDARDIZATION.—Inspection of the actual workings of the German system of military surgery and careful inquiries in France concerning the same questions showed faults that were freely admitted by the medical authorities and which the American system can avoid by practical standardization enforced by military order. A wounded man often passes through five or six hands before reaching a base hospital and he usually receives a different kind of treatment at each station. A comprehensive general plan, correlating the professional work from the trenches to the base can be worked out at

central headquarters that can be applied, according to circumstances, in each tactical unit or sector. One of the first desirable results would be to reveal the lack of certain personnel in some sectors and an excess in others, so that co-operative, clinical and teaching organizations could be in time effected for the care of the wounded from the front to the base. Concentrating the best facilities in the line of communications on all fronts is inadvisable especially for cases requiring more than one month's hospital care. As a general thing the quicker a case arrives in a base hospital, the better.

Military surgeons should always remember:

1. The first duty of the surgeon is to his patients; return them to duty or civic usefulness as soon as possible.
2. The obligation of the government and the man's rights.
3. Early ambulant treatment will shorten convalescence.
4. To begin active and passive exercises in bed at once.
5. To elect the proper position for an ankylosis; to avoid "drop-foot" and "drop-wrist," even an hour of which is harmful.
6. To treat the general condition and supervise diets.
7. To always encourage and cheer up the patient.
8. To cut plaster casts open as soon as applied and to discard them entirely as soon as possible.
9. To note everything of importance on the patient's history.
10. To practice economy in everything; economy is known only in Europe.

• **THE SOLDIER PATIENT.**—One cannot leave the subject of the medical and surgical care of sick and wounded soldiers without an appreciation of the almost child-like trust and confidence the average wounded soldier reposes in his army doctor whom he regards as a comrade. It is unmilitary for him to express his faith and gratitude in words but his uncomplaining patience and everything about the relations between an army surgeon and a sick or wounded enlisted

man, particularly, radiates a feeling that is difficult to define and calls forth the sincerest and most earnest interest and effort from the medical officer in caring for his soldier patients.

As a sick or wounded soldier cannot choose or change his doctor the military surgeon should always feel a far greater responsibility and obligation toward his patients than in civil practice.

VOLUNTEER NURSING AND WELFARE WORK UNDER THE RED CROSS.

IN addition to the minutely thought-out official sanitary corps of the army with its punctiliously drilled personnel and its perfect equipment there was in Germany a vast system of semiofficial and volunteer relief organization ready to be put into service at the first call for mobilization. Germany had learned in her wars of 1864-66 that the many deficiencies in the sphere of voluntary nursing, which was inaugurated at that time, were due to a lack of a firm organization and adequate preparation during times of peace. To correct these deficiencies became a matter of national concern.

ORGANIZATION.—In the first place the Red Cross organization has existed in Germany since 1864, when the Geneva convention was founded. Even before the formal adjournment of this convention, the Central Committee of the Prussian Red Cross was made a permanent institution and by 1869 it combined all the German principalities at a time when the political union of the country was still unrealized. In Germany the Red Cross is a democratic organization, every loyal German citizen taking an interest in its success. Its laws are closely connected with the political regulations of the country; its rights and duties definitely determined by the official medico-military authorities. But it is only one of several organizations interested in the volunteer nurs-

ing service. The others are the various confessional sisterhoods of trained nurses, both Catholic and Protestant, the Knights of St. John and of Malta and others, as well as the great "Vaterländische Frauenverein" or National League of Women, one of whose chief activities is the training of women nurses, and the "Organization of Voluntary Nurses" founded by John Wickern in 1866 for the training of men nurses.

THE VATERLÄNDISCHE FRAUENVEREIN was established in 1866 by Queen Augusta of Prussia on the occasion of the peace celebration in that year. By appropriate organization it planned to preserve in times of peace all those forces which had been active during the wars just past in the relief of distress and suffering and to keep them employed in conjunction with the Central Committee of the Prussian Red Cross. It aimed at a combination of relief workers throughout the entire kingdom and invited all women's organizations to affiliate themselves as branch societies. It became incorporated as a regular national society, its sessions to be held in Berlin. It was to devote itself first and foremost to the training of a competent nursing personnel during peace and to welfare work of the utmost scope and variety. This organization constitutes the women's branch of the German Red Cross and uses the Red Cross insignia. In 1914 the number of members amounted to 400,000 and the league owned property inclusive of real estate and institutions to the value of 20,000,000 marks. By September, 1916, there were 2335 branches throughout the Empire and a membership of 1,000,000 women. It has become a tremendously effective organization.

MEN NURSES.—The society for the training of men nurses and hospital attendants is also closely associated with the Red Cross and calls itself "The Organization of Voluntary Nurses in the War Work of the Red Cross." Its various branches belong to the national and provincial societies of

the Red Cross which superintends its work and finances it, as the society itself requests no fees or donations from its members. Its personnel can of course be drawn only from those men who are unfit for military duty either in active service or in the reserve. The justification for its existence and activity in recruiting in times of peace is that it considers itself "the shadow of the army." It has also, however, demonstrated its great usefulness on many occasions in times of epidemic and disaster.

IMPERIAL INSPECTOR OF VOLUNTEERS.—At the head of these various organizations is the Imperial Commissioner and Military Inspector of Voluntary Service; at present Prince Hatzfeld. This office was created in the campaign of 1866 by Emperor Wilhelm, in order to amalgamate the volunteer workers with the military department. During peace he has the supervision of the training of his army of workers so as to be ready at short notice for all emergencies in the event of war. Territorial delegates stationed in various parts of the country assist him in overseeing and planning the relief work. During the war his office is at Imperial army headquarters. His instructions and reports go back to his deputy military inspector at Berlin, who is connected on the one hand with the proper ministerial and influential authorities and on the other with the large group of voluntary workers, whose delegates at home and in the field are greatly increased in war times. For every important medico-military official in the sanitary department, a civilian of corresponding rank is appointed to represent the interests of the volunteers. The effective collaboration of these workers fits into the great web of the official work with a minimum of friction.

DIVISIONS OF RED CROSS WORK.—Everything connected with the Red Cross and its activities receives its authority from the proper national central offices. The divisions of the Central Committee which existed before the war and

which are still retained are: Division (1) for mobilization (2) for the volunteer staff of men nurses, (3) for depot affairs (4) for women volunteer nurses, (5) for collections and recruiting, (6) for administration. If there has been any change in the duties of these divisions it has been rather in the extent than in the kind of work. Since the war began, there have been added Division (7) for prisoners, (8) for exhibits of war booty for the purpose of raising funds, (9) for health resorts and institutional care for the disabled, (10) for welfare work divided into group (a) for tuberculosis and contagious diseases, group (b) for the care of infants and mothers and group (c) for the care of families. The work of these groups extends over everything that is necessary to the maintenance and reattainment of health in families, and the training of a healthy, able-bodied rising generation. It provides for the training of grown children to a profitable calling and the employment of all who are able to work. This division also sees to the training, examination and graduation of girls and women as voluntary nurses, their vaccination and so forth.

There is also a Division (11) for the care of refugees and the families of interned Germans, and one (12) for securing employment for the disabled; this is closely associated with Division 9 and the two divisions work in coöperation with The Welfare Commission for the War Disabled. Finally there is a Division (13) for the financial provision for the disabled and their families supplementary to State aid or pensions; the latter concerns itself only with the actual injury and not with the special requirements of the pensioner, such as a large family, old and feeble parents, sick relatives and similar conditions.

The central offices set the boundaries and give the general directions according to which the branch associations are to act; they give advice where it is asked or where it is deemed necessary and they offer the help which often is needed to

assure the success of their plans; but the local societies are otherwise practically independent and secure their own funds. This freedom greatly increases their efficiency.

TRAINING OF WOMEN NURSES.—In 1905 when the Russo-Japanese war indicated that dreams of universal peace were not altogether capable of realization, Germany took stock of her nursing force, basing her needs in this regard on the strength of her army and the number of field sanitary formations which would be needed. Following the urgent advice of General Rothe of the Artillery, the central committee of the Red Cross working with the War Department urged the imperative necessity of increasing the nursing personnel. The needs of the army were placed at 15,000 nurses. While the Imperial Register set the number of women nurses at 74,986, there were included in this number a high proportion of illy educated and poorly trained women acting as attendants in asylums, etc. About 26,000 in this total were Catholic Sisters; about 12,000 were deaconesses; the Red Cross counted between 3000 and 4000; the German Nurses' Association 3000. According to Dr. Koerning, member of the Central Committee of the Red Cross, a census in 1905 revealed that there were only 20,000 fully trained nurses in Germany, not including Bavaria, who would be fit for duty as war nurses and a large number of these would not be available on account of the needs of the home communities. Thereupon the Central Committee of the Red Cross and the National League of Women, Vaterländische Frauenverein, put forth every possible effort to increase the number of nurses. This effort received an especial impetus from the fact that in 1907 an examination was introduced by the state which laid down in writing the conditions under which recognition by the state was accorded to nurses after a training of one year. These test regulations were at once adopted by the Red Cross. Even this, however, did not produce enough nurses to satisfy the need. It was difficult to obtain

a sufficient number of women who would undertake training for a profession for which in ordinary times the demand was limited.

Voluntary nursing forces for the express purpose of service in war had therefore to be enlisted and trained. After many tedious deliberations, regulations were issued in 1908 concerning the training of auxiliary nurses and nurses' aids. These created two classes; one of which, the auxiliary nurses or "sisters" as all nurses in Germany are called, received a half year's training and the other, the nurses' aids, a six weeks' training in practical and theoretical courses, with later supplementary courses.

The auxiliary sisters are women whose domestic relations are such that they can be spared from home for half a year to learn nursing in the wards or operating rooms of hospitals and who can every two or three years give from six to eight weeks' service in a general or maternity hospital, but who cannot for some reason follow nursing as a profession. Usually they substitute for nurses out on leaves of absence or ill, but in war they relieve those who have been sent to active duty at the front.

A special text-book was issued by the Red Cross Central Committee which was elaborated with the permission of the respective authorities by following the military text-book for sanitary forces. By this means the training of the volunteer nurses proceeded along the same lines as that of the sanitary corps. Experience has fully justified this as a wise procedure.

Within forty-eight hours after the call for mobilization in 1914, 5000 graduate Red Cross nurses who had been nursing the sick professionally in time of peace and from 1000 to 1200 assistant nurses reported for duty. A large number of nurses' aids, those who had received the six weeks' training, also offered their services. Those of the latter who had taken up the work as a fashionable fad soon dropped out, but a

few months of war so developed some of them that the Red Cross Society announced that all those who after four months' service were found competent should be promoted to the position of auxiliary sister. Another important step was taken in the spring of 1915 when they were given the opportunity to complete their training and at the same time were given credit for the period of their service in the war.

While the principle which led to the introduction of nurses' aids was fully justified it was early recognized that the few weeks of training was insufficient, and their instruction has been continued under the local Red Cross branches of the Vaterländische Frauenverein and has developed into a two years' course. At the end of this time they receive a diploma and an official brooch, can wear the full uniform and are registered as graduate army nurses and become a part of the system of national defense. Distinguished service medals for merit are awarded these women by the Emperor.

The Red Cross nurses work in all hospitals, both Red Cross or Association Hospitals as they are called and the military hospitals up to and including the line of communications hospitals. Wherever it is advisable they are under the supervision of the Deaconess nurses. These are usually mature women who have received several years of training in the various deaconess training schools throughout the empire, which are all modelled on the famous institution at Kaiserwerth. Many have had years of experience in the big clinics in every department of work. They live in the hospitals and have charge of the "stations" or sections of patients.

The Red Cross nurses are of the best type of young women from twenty to thirty-five years of age; they are nearly all of the best families and live at home when on duty in their home towns; but can get any meals they may want in the hospitals. Their instruction is not up to the standard of that in America but their desire to learn is intense, and as

they are all educated they are capable of training to any degree. They are the only material from which reliable war nurses in large numbers can be developed in any country. The older trained professional nurses cannot be relied upon as a class to carry the burden of all the work of war hospitals, demanding long and irregular hours, changes of stations, sometimes involving hardships and new environments in a foreign country with a foreign language. The mature, experienced, trained, professional nurse should bear the same relation to the younger army nurses that officers do to their soldiers. Their positions should be those of superintendents, chief nurses, dietitians, anesthetists or matrons, and all should be selected with reference to their ability to manage young people and to instruct them during their courses of training. The latter qualities are most important and should be insisted on or discontent, unhappiness and failure in discipline will seriously disturb the service.

The pay of a nurse in Germany is a little more than one mark per day, paid every three months, when they receive 99.90 marks. A corps of 50,000 nurses thus costs the Empire for salaries only \$3,650,000 a year. In America an equivalent number of nurses would cost the government for their salaries \$30,405,545.

MEN NURSES.—Men nurses and hospital helpers to the number of 15,000 were also ready at the day of mobilization. These, recruited from all classes and trades and professions, a large number coming from the academies and universities had, previous to the war, received a theoretical and a practical course in nursing, each of six weeks' duration and had kept in practice by frequent drills and attendance at hospitals and clinics. Their work in war is done chiefly in the home and line of communications zones; they need not be active on the battlefield nor in the field hospitals. Their services may be required in accompanying the wounded and sick on the trains. One nurse accompanies from 12 to 20

wounded. They wear Red Cross uniforms and are divided into companies of 41 men each.

All these organizations for voluntary nursing had, even in times of peace, received their assignments from the Imperial Commissioner and considered it a sacred duty to prepare themselves for the event of war. They practised year in and year out during vacations and spare time to perfect themselves in nursing and transport duties.

PERSONNEL.—By February, 1917, the Red Cross personnel amounted to 179,000: 40,000 were men nurses, 30,000 of whom were in the line of communications; 62,000 women nurses, 11,000 in the line of communications; 1,000 women laboratory assistants, 700 in the line of communications; 5000 kitchen personnel, 1500 in the line of communications; 45,000 bearers, 35,000 in home hospitals; 2500 supply depot personnel, 1800 at home; 700 clerks, 600 at home; 800 disinfectors, half at home; the balance consists of laborers and workers of all kinds.

EQUIPMENT AND TRAINING.—In regard to the material equipment for voluntary nursing, the planless gropings toward possibilities of help that heretofore have characterized volunteer work were gradually eliminated. So far as possible the military authorities had set definite requirements concerning the sort, extent and place for various services and the societies had endeavored to follow them even before the war. Orders for the establishment and management of private and association hospitals and convalescent homes of the Red Cross had been given by the proper central executive committees long previous. By publishing the patterns for the making of hospital and sick-room linen, clothing, underwear for the patients and other sewing products, the societies were enabled not only to prepare in peace but also to take hold of the pertinent tasks without delay. A part of the instruments and implements required, particularly those that would be difficult to obtain after mobilization, were

bought before the war and were held in readiness according to the directions of the printed publications; the rest were bought after the outbreak of war. Joint practice of the women's societies with the men's divisions were responsible for the fact that almost everywhere a knowledge of what was absolutely necessary and what was dispensable was broadcast, so that after the mobilization orders were published hardly a single question was asked of the Central Committee of the Red Cross, showing that there was no doubt in the minds of the workers. Everything went along its regulated way apparently as if from habit, even the places of refreshment along the way were ready when the troops were ready to march.

RED CROSS BARRACKS.—In one special field the Red Cross had for years worked out a well-planned preparation for war; it had collected portable barracks for the erection of hospitals, especially for contagious or suspected contagious diseases. The Central Committee had stored for some time numerous barracks with full equipment in order to be prepared at any time for the outbreak of contagious diseases. Such barracks can be erected and equipped within a few hours where they are needed and fulfil their purpose in any weather and any climate. They have proved themselves equally efficient in the ice fields of Siberia and in the burning heat of a South African sun and have been tried out hundreds of times in Germany. A part of the men of a sanitary division and of the associations are perfected in the erection of these barracks and a certain percentage are trained for the process of disinfection.

RED CROSS TRANSPORTATION OF THE SICK.—The voluntary nurses and the men orderlies had by long practice perfected themselves in the handling and transportation of patients. Besides the hospital and assistant hospital trains which the military authorities held in readiness and sent with the first load of surgical supplies to the front,

the Red Cross immediately after the outbreak of the war **set** to work their association hospital trains which had been **held** in readiness according to military instruction. In **Bavaria**, **Württemberg** and **Baden** these trains were dispatched at once by the national societies of the Red Cross. The German Central Committee delivered its four society trains promptly on the fifteenth mobilization day and the **Prussian** Committee its six trains on the twenty-second and the twenty-ninth mobilization days. Quite a number of additional association hospital trains were furnished by the various provincial and national societies of the Red Cross and up to this day such trains are prepared and equipped with a regular army staff. To enable the speedy and careful transportation of wounded from the dressing centers and field hospitals to the frequently distant railroads, hospital trains and ships, automobiles in large numbers were offered and used. But up to date it has not been possible to meet all requirements; especially is this true on the Eastern front where conditions are not yet quite as well regulated as expected. Lately, voluntary service has endeavored to stop the gaps that are here and there still noticeable.

Early in the war the Red Cross erected in conjunction with the General German Automobile Club several auto stations, each consisting of six auto trucks, for the transportation of provisions and articles of luxury from the line of communications zone to the fighting troops and field hospitals and to take the wounded back to the hospitals. A part of these auto stations have been disbanded because they seemed dispensable here and there after the change in the war situation. The rest remained; in fact, their staffs and numbers have been increased considerably. The transportation of the wounded at home from the railroad stations to the hospitals is for the greater part in the hands of local Red Cross societies and is being improved continually. Early in the war a charitable woman in Berlin donated an electrically heated and lighted

automobile which could hold eight soldiers lying or twenty sitting. A large number of these were later employed.

FUNDS AND LOTTERY.—It can be readily understood that the financing of the varied activities of the Red Cross is a tremendous undertaking. To obtain voluntary gifts through collections the "Imperial Commissioner and Military Inspector" immediately at the beginning of the war urged the people to donate liberally and designated the places where such contributions would be received. Following this, came appeals from the various branch societies for gifts from home and abroad. A popular and successful source of income is the national Red Cross Lottery which is held under governmental auspices every three months. One million marks worth of chances are sold, two-thirds of which goes to the Red Cross Society and for expenses and one-third to the prize fund to be divided among the holders of the winning tickets. Tag-days are numerous, in fact every day is tag-day in Germany. Up to June, 1916, the German Red Cross had expended 426,000,000 marks, 15,000,000 of which came from the United States.

DEPOTS FOR GIFTS.—Depots for the reception of gifts are established in the line of communications and here they are turned over to the military authorities and the responsibility of the Red Cross ceases. Military exigencies sometimes prevent the delivery of these gifts. This has given rise to criticism of the Red Cross. The question whether and where woolen underwear, provisions and certain articles of luxury are needed is primarily answered by the military authorities; they alone are deemed competent to judge whether or not the shipments to the fighting troops are permissible and expedient. Military necessity peremptorily demands that the transportation of munitions and provisions shall take precedence of all else.

In addition to the furnishing of a voluntary nursing personnel and its care for the comfort of the soldiers at the front,

the Red Cross and the affiliated women's societies find an **inexhaustible** field of activity in ameliorating the harshness of war for those at home.

DOMESTIC SCIENCE SCHOOLS FOR GIRLS.—Previous to the war the National League of Women had, in conjunction with the Chamber of Agriculture, established domestic science schools. These schools were to acquaint the young girls from the class of small farmers, laborers and others with the most essential fundamentals of domestic science. Their value in the present scarcity of food has been inestimable.

MASS FEEDING OF THE PEOPLE.—Information to the entire population on the subject of national nutrition is disseminated by the league and the mass feeding of the people by means of war kitchens and "goulash cannons" has also come under their supervision. At these public kitchens one liter of very palatable meat and vegetable thick soup prepared according to a fixed caloric value is sold for 30 pfennigs; for the average appetite it is nearly enough for two meals.

GAMES AND RECREATIONS.—As indicated in the chapter on Base Hospitals the furnishing of recreation and amusement for the soldiers both in the trenches and the hospitals is regarded as an important feature of welfare work. "The soldiers in the field want games," was the information that came back from the trenches soon after the outbreak of the war. To forget the fearful realities of his life, the soldier needs diversion in his hours of rest and relaxation. At times he is too exhausted to read and simple games fill a great want. Games in the hospitals have a much greater usefulness than is generally realized. The Woman's League has therefore made a systematic course in wholesome, interesting games a part of the army nurse's training course. Printed outlines have been prepared of the games suitable for the various kinds of welfare work carried on by the society. In this are listed games suitable for hospital patients,

for the trenches, for blinded soldiers, for the children in municipal playgrounds; games for adolescents and entertainments of all kinds for the disabled and convalescents.

The games for the trenches mentioned are checkers, chess, dominoes and similar well-known games played on boards with dice and figures. These are made as small as possible so as not to overburden the soldier's knapsack. The boards are made of stiff oilcloth or leather and can be folded up; the figures are kept in small linen bags. Puzzles, card games of all kinds, including the educational series are also very popular. Booklets containing riddles, puzzles, and amusing tricks of all sorts are furnished. In the hospitals, for patients who are not bed-ridden, games involving active motion are planned and many long-forgotten simple games have been revived; light gymnastics with music are also found to be valuable. For the blind many books, magazines and games are provided. Through entertaining games the blind are most apt to regain their cheerfulness and self-confidence. After their interest in life has been thus reawakened it becomes easy to train them in useful remunerative occupations.

These are some of the endless activities of the women of Germany, and so well have they performed their tasks of relief work and so vital to the existence of the army in the field has been the efficient coöperation of "The Army of the Empress" at home that larger spheres of usefulness are being opened to them every day. Not only are they taking the place of men in the performance of work in every trade and occupation but their assistance is being sought in high administrative offices in the government. The war will mean the emancipation of the German woman from her heretofore limited life.

REEDUCATION OF THE WAR DISABLED.

THE WELFARE COMMISSION FOR THE WAR DISABLED.

To the task of caring for and training those disabled in the war Germany has applied all her powers of organization and attention to detail. It was obvious that for both ethical and industrial reasons this great work could not be neglected. Men who had suffered in the service of the country could not be left helpless to eke out a livelihood grinding hand-organs or peddling pictures, as had been the case in former wars, although one enterprising factory immediately began the construction of thousands of hand-organs and another the production of cheap patriotic pictures. Neither was it considered desirable for the disabled to drag out a useless existence in State homes and institutions, a burden to themselves and the country. On the industrial side the necessarily enormous numbers of disabled men who would be only consumers instead of producers in the various communities could not fail to be viewed with apprehension.

As it is an absolute essential to effective treatment that the work of restoring a man to usefulness begin as soon as possible for both physical and psychological reasons, and that it be carried out with unremitting application, it was soon recognized that coöperation between the military and the civil authorities was necessary. In this way the work can be commenced as soon as a man enters the hospital and a preparation made for a useful life as a civilian while

he is still under military control and before habits of helplessness are formed. It had been noted that many of those injured in war, upon recovery, appeared quite indifferent to the question of how they would earn their livelihood after their discharge from the army and whether or not they would be able to resume their former occupations. A large number expected to be provided for by the government, either through pensions or through the creation of positions under the State control, especially in the railroad and postal services. Some it was feared, unwilling to do work of any kind, might desire to live on charity. It became evident also that there was need for the education of the entire public, of the industrial interests and the trade fraternities in their attitude toward the disabled man. He had to become an accepted fact and a place made for him, not as a "cripple," but as one honorably disabled in war (*Kriegsbeschädigter*).

Early in the war the German Societies for the Care of Cripples and the Red Cross had offered their services in behalf of the injured soldiers and at first the men were assigned to the existing institutions. The larger base hospitals with orthopedic departments had also begun as an experiment instruction in penmanship, grammar and arithmetic, and employment agencies for the disabled had been established in certain municipalities. It became apparent early in 1915 that more extensive measures must be adopted, not only for orthopedic treatment and restoration to usefulness, but for the institution of a faultless and far-reaching follow-up system of supervision and care, since about half of the casualties required some orthopedic and reconstructive attention. Thus the organization known as The Welfare Commission for the War Disabled came into being. It aimed at a joint collaboration of the military and civil authorities and a coöperation of all industrial and trade organizations together with the various polytechnic and commercial schools.

The comprehensiveness of the organization can be seen from the list of authorities and societies that constitute the Welfare Commission for the War Disabled in West Prussia. The same holds true in other provinces throughout the Empire. The West Prussian Commission for the War Disabled consists of the Commanding Generals of the three army reserve corps in the province; the royal governments of Danzig and Marienwerder, the West Prussian provincial government, the provincial society of the Red Cross, the National Women's League (*Vaterländische Frauenverein*), the West Prussian Congress of Citizens, the West Prussian country districts, the West Prussian Union of Employment Bureaus, the West Prussian insurance institutions, the Royal Railroad Directory of Danzig, the Royal Consistory of Danzig, the West Prussian Council of Physicians, the West Prussian Chamber of Agriculture, the Executive Committee of Merchants in Danzig, the Chambers of Commerce of Danzig, Elbing, Graudenz and Thorn, the Union of East Prussian Manufacturers, the Trade Councils of Danzig and Graudenz, the West Prussian Society for the Care of Cripples, the West Prussian district branch of the Society of German Engineers and the Society of Employees.

The chairman of the Welfare Commission is the commanding general of the province; his deputy is the chief presiding counsellor of Danzig; a high administrative officer is the business manager. The duties of the Commission are to solve the problems of organization for the local subcommittees, to fix general regulations for the care of the disabled, to enlighten the public through the press and by literature and lectures, and lastly to give direct aid in special cases.

DETAILS OF ORGANIZATION.—The chairman of the local subcommittees in the towns is usually the mayor; in the country districts, the administrative head. The membership includes town councillors, doctors, directors of industrial and commercial schools and representative business-

men and artisans. The duties of these committees are (1) to give vocational advice to individuals, (2) to create and arrange courses of instruction for further education in the former profession and (3) to obtain employment for the men with the aid of the public employment bureaus.

Welfare Divisions were also created by order of the commanding generals of the different provinces, in all reserve troop divisions, battalions, squadrons, artillery and machine-gun companies, garrison battalions and fortress troops. Each of these military welfare divisions has also its three bureaus of vocational advice, training and placing. They work in the most intimate coöperation with the hospital-schools and the local civilian welfare subcommittees.

The treatment of the injured men up to the time of their discharge is exclusively the business of the military authorities; they are under the jurisdiction of military discipline during this time. With the organization of the civilian Welfare Commission they are enabled to receive the guidance and assistance of civilian and industrial authorities while still under the essential military control. While patients are not compelled to take part in the hospital-school and workshop activities, they are usually willing to do so, and once begun the courses must be continued.

VOCATIONAL GUIDANCE.—While still confined to his bed in the hospital the patient's psychological education is begun. His doctor, his nurse, in fact everyone who comes in contact with him, are as solicitous for the restoration and strengthening of his flagging will-power as they are for his physical rehabilitation. Pity does not help a disabled soldier. A matter-of-fact, cheerful acceptance of his injury and encouragement to a realization that life still holds possibilities of usefulness and happiness for him helps more than mere sentimental sympathy. He must be taught that the loss of a limb or other apparently serious disability need not darken one's outlook on life if one only has the firmness of

will and determination to rise above it. Over the door of the workshops connected with the great "Hakelwerk" hospital in Danzig, one of Germany's most successful orthopedic reëducational institutions, is the legend, "Will-power conquers." This is the keynote of the system.

Doctors on their hospital rounds call attention to the facilities for restoration to usefulness provided in the schools and workshops and urge the men to apply to the bureau of vocational guidance for advice. Patients are given the opportunity of observing their injured comrades take part in the courses and occupations. A monthly hospital bulletin and papers containing the reports of the Welfare Commission and the possibilities of employment for disabled men are distributed among them.

Consultations for vocational guidance are prepared for by the filling in of a printed questionnaire (found in Appendix A), giving a personal history of the disabled man to date. This forms the basis for a biweekly consultation with the adviser. The adviser is an authorized representative of the particular trade the man has formerly followed or may wish to follow, or he may be the director of a polytechnic school, or in the case of farmers, a practical member of the department of agriculture. The consultation is confidential and is held privately to afford the patient an opportunity to speak freely. In the choice of a calling the opinion of the attending physician, especially that of the orthopedic specialist, is the basis of the advice given. It is the work of the vocational adviser to continue the restoration of hope and courage and to gain the confidence of the man. He impresses upon him that, with the advance of medical science, a hopeless cripple is rare and even a seriously mutilated man may become able to work if he has the firm determination to do so. He does not give him sympathy but sound, practical advice.

Three points receive special consideration: (1) If possible,

all injured men are to resume their former occupations and in their former surroundings; (2) if this is not possible, the attempt is to be made to have them use their knowledge and training in some related vocation; (3) a vocational change is to take place only in extraordinary cases. The resuming of the former occupation is especially emphasized in the case of farmers and farm laborers. In West Prussia an appeal has been circulated to induce them to return to the land. (Appendix B.)

The vocational consultation gives rise to an abundance of interesting but frequently difficult questions. One of the most important of these is the fear of loss of pension. The man must be thoroughly convinced that his ability to engage in remunerative employment has no influence on his right to a pension from State and empire. The law does not permit the lowering of legal pensions on account of a man's earning ability. A diminution or withdrawal of pension occurs only when the earning ability has been very greatly increased. There is no general rule for a reduction of pension based on increase of earning ability. It should be borne in mind that a pension of 180 marks annually is paid as long as the pensioner is in any way disabled from his full capacity for work. In the same way there can be no change in the special provision for maimed soldiers. Accordingly a man who has lost a hand or a foot receives, besides his disability pension, an added pension of 15 marks a month and a "maimed pension" of 27 marks a month; if he has lost both eyes he receives 54 marks a month additional no matter what his wages may be.

Another point on which discussion is necessary is that of the "employment certificate" which every soldier is entitled to demand and by means of which he hopes to obtain a well-paid minor official position. It must be explained that this offers but few opportunities, as these positions must be kept open for the eventual return of their former holders or for such soldiers as have served their full military time and

seek civilian employment. Besides, the law for the care of troops provides that pensions of public officials are considerably lowered; this is not the case for private positions and occupations. At the same time the men are warned against overfilled and overapplied-for positions such as secretaryships, letter carriers, porters, peddlers, elevator operators, messengers, etc., if they are at all able to do skilled work or can become so.

The extent to which the vocational adviser is effective in persuading the wounded to return to their previous work, if possible, is shown by the data which follows. From June 1 to August 1, 1915, 524 disabled men applied for vocational advice to this bureau in Coblenz. Since all data was not fully recorded the first few days, the report is made on the basis of 454 cases.

	Before consultation.	After consultation.
Wanted to take up former work	191, or 42 per cent.	404, or 89 per cent.
Wanted to enter a new field	68, or 15 per cent.	18, or 4 per cent.
Wanted to be employed in the postal, railway or public service ¹	118, or 26 per cent.	32, or 7 per cent.
Were without choice or plans	77, or 17 per cent.	0, or 0 per cent.

Vocational advisers must continue their interest in and connection with a man throughout the period of his stay in the hospital and his training in the hospital-school.

The training in the hospital-school is elaborated in the chapter on Orthopedic Hospital-schools. There is at least one of these in each army-corps district. The workshops in connection are placed under the direction of able and enthusiastic physicians and their staffs. The equipment

¹ Of these about one-half were beyond a doubt able to resume their previous work.

and the instructors are furnished through the affiliated industrial and technical organizations of the Welfare Commission who either give or lend, free of charge, the necessary men, machinery and tools.

Upon the release of a disabled man from the hospital or the hospital-school he is given a properly filled-out information sheet showing what has been done for him in the hospital and data concerning his personality and circumstances. He is then sent to his troop in the reserve corps with a notice that he is no longer capable of active military service.

The activity of the Troop Welfare Division then commences. The man must report personally to the Director of the Welfare Division within three days after joining the troop for the purpose of obtaining his dismissal from the service. He receives a number which is used for him thereafter in all correspondence. He is so quartered that a personal and intimate contact with his adviser can be maintained. Proceedings are at once instituted by the Welfare Division for the establishment of his disability for service; the necessary papers are obtained for him and he is also enlightened, if necessary, in regard to his pension claims. In a verbal, confidential, private interview the director seeks to form, with the help of the information sheet brought from the hospital, some further idea of the personality, aims and inclination of the man. The vocational advice then follows according to the plan outlined under the vocational advice in the hospital. It must never happen that the advice given a man differs greatly from that which he has formerly received. In case of any difference of opinion between his advisers a written or verbal interchange of ideas takes place, always, however, unknown to the man in question.

As in the hospital the fear of the loss of pension has to be combated and it is never permitted to ask a man if he wants an "employment certificate;" any request he makes for it must be fully investigated. In filing an application for such

a certificate, it must be reported whether or not in the opinion of an expert a change of work is absolutely necessary, whether or not the man has been given opportunity to train in his own or a new profession and for men who have formerly been employed in some civil service capacity, a certificate of such employment must accompany the application.

The director of the Welfare Division gives lectures to the soldiers and public lectures to convince the soldiers of its unselfish intentions. Each division has a library which contains military regulations pertaining to this branch of the service, the most important books and pamphlets regarding the care of the disabled, professional training, professional advice and employment bureaus. The reserve general command from time to time transmits to the troop divisions notices of vacancies sent to him by the civilian Welfare Committees. These the Welfare Divisions carefully compile, post the lists and frequently call attention to them. In making arrangements for positions the men are, if possible, sent back to their home towns, and to the same employment.

COÖPERATION OF THE MILITARY.—No man may be dismissed from service or resign from his troop division until he has begun to draw his pension. Every unserviceable man who is to be discharged, or furloughed until his discharge, must report at once to the advisory office of the Welfare Division for the purpose of a final conference and to leave there a card with his future address. His information sheet is inspected to see that it is complete and he is then sent to the office of his military district commander. There he receives printed directions in case he has not yet a definite civilian position in view. These directions tell him that even though he may be only on furlough he must within a definite time report to the designated civilian Welfare Committee at his home. At the same time he receives an addressed return field postcard with his list number and on

this he must at the end of a given time notify the advisory office as to his whereabouts. The home or local Welfare Committee is notified of each discharged or furloughed man. An attested copy of his information sheet is sent with the notice.

Any of the men who are to be discharged and can show that they have found a position either alone or through the agency of the advisory office, notify that office shortly before their furlough or discharge and leave their names, addresses and the addresses of their future employers. They are also urged to notify the office of their movements by means of a field postcard. The advisory office notifies the employer of the discharge or furlough and the address of his future employee. He is asked to notify the office whether and when the man commences work. This correspondence takes place on special field postcards with return cards sent out by the office. In case a man does not report for work, notice of this fact is to be sent immediately to the proper military district commander.

The district command in which the disabled man lives after his discharge is minutely notified of the case through the pension documents, which include the prescribed information sheet. Thereupon the district command must report to the civilian Welfare Committee the names of all men who have not found positions or who have not accepted the positions obtained for them.

The further care, education and training of the disabled men then comes under the direct jurisdiction of the home local Welfare Committee with its three bureaus of vocational advice, training and employment. This committee does not wait for the men themselves to come for help and advice. On the contrary it seeks to come in contact with them either directly or indirectly with the help of the local officials or the clergy and no time, effort or money is begrudged which helps them to enter upon a useful career. If consultation

with the committee necessitates a trip to a larger town which entails expenses that the man is unable to meet, these are defrayed by the committee. Those of the injured who have been discharged with a pension particularly need supervision and help to keep them alive to the desirability of entering upon some definite work.

COÖPERATION OF THE INSURANCE COMPANIES.—In case a disabled man requires any further treatment after his discharge from the army the Welfare Commission either furnishes it or defrays the expense. For this purpose arrangements have been made with the Red Cross "Division for Health Resorts and Institutional Care" in Berlin. In addition the Commission also works in the closest coöperation with the social insurance companies, particularly with the provincial and national insurance institutions. To each soldier injured or disabled is guaranteed all additional necessary treatment in a hospital, sanatorium or health resort, free of charge if necessary, allowance being made for his civilian status. Applications for such treatment are accordingly made either to the Welfare Commission of the province or to the local subcommittee.

TRADES AND OCCUPATIONS TAUGHT.—Further opportunities for education and training in addition to the hospital-school and workshop instruction are furnished the men. For instance, in West Prussia there have been created Divisions for Disabled Workmen in the War Administration Office in Danzig. These were founded by the commanding general of the Reserve Corps Command. They offer opportunities for learning the saddler, shoemaker and tailor trades. The men enter as apprentices and receive besides their pension a wage of 3.50 marks per working day. They are trained by masters eight hours a day for two years and at the end of their apprenticeship they take a journeyman's examination. They receive instruction in their trade for six hours a week from trade-school instructors.

There are also opportunities to learn the trades in national, State and private workshops under legally regulated conditions. The trades taught are in the building trades, the work of building overseers, architects and building secretaries; in the clothing trades, that of shoemakers, tailors and furriers; in the furniture trade, that of cabinetmakers, carvers, etc., stone-cutters and wood-turners; in the metal trades, that of wrought-iron workers, molders, goldsmiths and gunmakers; in the food trades, that of confectioners and cakemakers. There is also instruction provided for those who wish to learn mechanics, surgical and orthopedic mechanics, art mechanics and the work of electricians, bandage and truss-makers, watchmakers, sail- and ropemakers.

Their apprenticeship lasts two years but can be shortened to one and a half years by the Trade Council. After this period, apprentices are admitted to the journeyman's examination free of charge. The men are separated from the youthful apprentices so far as possible in the shops and entirely in the theoretical classes. The instructors are legally authorized persons. The theoretical and continuation instruction takes place twice a week from three to six o'clock. No wage deduction is made for this time. The pension is paid in addition to the wages which are 3.50 marks per working day of eight hours or 4 marks for nine hours. A journeyman who wishes to prepare himself for the master examination receives his preparation free of charge. After passing the journeyman's examination he is provided with a suitable position. The same is true of those who have passed the master's examination.

Notice of all who wish to learn a trade is sent by the chief physician of the hospital to the Trade Council in Danzig. Those who have been discharged from the army and wish to learn the saddler, shoemaker or tailor trade make their application to the Division for Trades for Disabled Soldiers in Danzig.

Soldiers who are learning a new trade, as a rule, receive instruction in large workshops. But seldom will they serve as a single apprentice with a master. Since in such cases the master will not be able to pay sufficient wages, the Welfare Commission must necessarily give him an allowance large enough to enable him to live. As a matter of principle the local subcommittee contributes a small amount.

Disabled farmers and farm laborers deserve special attention. It has been indicated that it is an important problem of the advisers to retain all of this class if possible in their former occupation. Arrangements have been made whereby they can receive preparatory training in the hospitals. They learn simple problems in handwork; basket weaving, carving handles, lattice and fence building, etc. Good elementary education and practical instruction are also provided.

For the education of farmers who are still under hospital treatment the Sanitary Department of the Army Corps has established a hospital-school in the fortress at Graudenz. All in the province of West Prussia who were formerly farmers or wish to become such are sent to this school. They learn not only theoretical but practical farming on the extensive grounds connected with the fortress hospital or on nearby farms. Here they learn to use their artificial limbs so that at their discharge from military service they will be in a position to take remunerative employment and to increase considerably their incomes from pensions.

For soldiers who have been discharged and who wish to become farmers opportunities are offered at another institute in West Prussia to receive a practical training and to learn even the heaviest farm work, such as mowing, ploughing, etc., using the artificial limbs and "working arms" made specially for this purpose. They receive during the time of their education free room and board to the value of 2.50 marks per day and a cash wage of 1 mark. For further

details reference is again made to the printed appeal: "To our Disabled Farm Workers," in appendix B.

For disabled farmers with a small fortune who wish to become independent, the Welfare Commission will coöperate with the German Farmers' Bank of West Prussia to furnish small leaseholds. The same is true of soldiers who wish to acquire a home of their own with from 4 to 12 acres of garden land in the neighborhood of some town. The magistrate of Danzig will give any information to settlers around Danzig. According to rumor there seems to be a movement on foot to pass a law which is to permit capitalization of pension which can be paid to a man for acquiring a settler's property. So long as this law has not been passed many soldiers will see their hopes frustrated by lack of means. A Settler's Company in the province has declared itself ready to lease small farms to soldiers under easy terms until the law becomes effective. Notices of such properties must be given to the Welfare Commission or to the local subcommittees.

TRAINING OF OFFICERS.—Not only disabled common soldiers and petty officers of the working classes need help but also many officers who have been forced to enter civilian professions on account of their injuries. National, State and municipal authorities have declared themselves ready to examine applications from officers and to exercise the greatest consideration and leniency in considering them. Physical defects are not to be considered as impediments except where absolutely necessary for the good of the service. The same is true for advanced age.

From the lists of suitable positions suggested to disabled officers can be mentioned the following:

1. In the revenue department all better positions up to inspector-in-chief are open to discharged officers. Applicants who hold diplomas as "upper" seniors (Oberprima) of a college or other institutions of the same rank receive positions of supernumeraries, others as revenue inspectors.

On account of the outside work in revenue warehouses, distilleries, breweries, etc., only men with sound limbs are taken.

2. In the department of stamp and inheritance taxes only applicants with senior certificates of colleges and institutions of equal rank are considered. The work is largely clerical.

3. In the administration of jails the positions of director, inspectors and assistants are open to officers. There is no age limit.

4. Clerks of the Court. In the choice of candidates for Justices of the Peace, officers are preferred above all, excepting soldiers who have served their time as such and are seeking civilian employment. The time of preparation is two years if the work is satisfactory; at the end of that time an examination is required. The appointment according to lists usually follows several years after the successful examination.

5. The officers usually find suitable berths in the career of court attorneys, for it is possible to open an extra number of secondary positions here.

6. Applications for positions of police district commissioner in the provinces, police officers in Berlin and its suburbs, royal police commissioners in the provinces are favorably considered.

7. Officers are preferred as chief commissary officers, town mayors and bailiffs in the provinces.

8. The railroad administration has made concessions to disabled officers. Positions such as the following have been opened to them: Advancement in the administration of material and station service, several positions for railroad secretaries, as well as inspectors and inspectors-in-chief of stations and customs service. It is taken for granted that the applicant has had some time for preparation, at the most one year. The nature and length of time of preparation are dependent upon the military career and the ability of the officer.

9. Officers of the engineering corps can readily find employment as active railroad engineers or technical railroad secretaries in the building and machine departments.

10. In the Imperial Patent Office suitable officers of the artillery, navy, technical troops and institutes can find positions in the technical bureaus and as technical assistants.

11. Officers who were teachers in military technical institutions have good opportunities for employment as technical assistants and regular members on the "Normal Gauge Commission."

12. The creation of a number of new positions for officers in the administration of the army after the war is being considered.

But not less than the official authorities have the industrial and commercial interests declared themselves ready to employ disabled officers and to give them preference over other applicants. Agricultural interests through their authorized representatives have repeatedly expressed their readiness to employ disabled soldiers of all kinds and ranks.

In the Royal Technological University at Danzig the Commanding General has provided university courses for disabled officers. These serve a double purpose. They are to prepare disabled officers who were forced to leave military service or to change their former vocation for a suitable position in civilian life. Furthermore, they are to give a chance to acquire the rudiments of their future official duties to officers who wish to fill military administrative positions. A knowledge of political economy as it is taught in the various courses is an absolute prerequisite for good results in any vocation which a man may choose. Besides general subjects each course requires special professional knowledge. To acquire them will not be difficult.

Terms of Admission.—The following are admitted to the courses:

1. Officers by profession (Berufsoffizier) who have been apparently permanently disabled.

2. Officers by profession who have been permanently disqualified for army service.

3. Discharged officers receiving a pension.

4. Disabled officers of Furloughed Classes 1 and 2 who are forced by injuries received in active service to change their former civil profession.

5. Under the same conditions as 4 furloughed petty officers and men with sufficient preparatory education.

Besides, officers in service who wish to perfect their education may attend the courses in so far as they do not conflict with their military duties.

The first course began February 1, 1916, and a second one in September of the same year. They are given in the Royal Technological University of Danzig. There are no tuition fees.

Catalogue of Lectures and Lessons.—1. State and Administration Law: Fundamental principles of State and administration law, approval, erection and supervision of industrial institutions, problems of State and town officials regarding laws governing epidemics.

2. Political Economy: Fundamental principles of political economy, political economy policies, money, banking and exchange systems, merchants and their importance in economic life, examples of branch warehouses, shipping forwarding agencies, economic questions of towns, insurance system and laws, insurance mathematics, commercial arithmetic, science of material and commercial geography, book-keeping and commercial correspondence, newspaper affairs, etc., political economy practices, college of rhetoric.

3. Law: Fundamental principles of civil law, commercial draft and check laws, penal rights, trial and court provisions.

4. Machine and Electric Technic: machine technic, rail-

road machinery and management, iron and the iron industries, power plants, electrotechnic.

5. Languages: Russian, Polish, French, Stenography.

The West Prussian provincial administration directs its efforts in a high degree to the interests of the blind soldiers. Soon after the outbreak of the war a number of beds in the Emperor William-Augusta Institute for the Blind in Königs-
tal near Danzig, belonging to the West Prussian Provincial Alliance, were offered for blind soldiers, officers as well as men, in consideration of a small fee. The army administration has taken advantage in a number of cases of this opportunity to care for soldiers who have lost their sight in the war. Some blind soldiers who had been discharged with a pension have asked to be admitted to the institution. The provincial representative body has decided to erect a home for blind soldiers on the extensive grounds of the Königs-
tal Institute and the work thereon commenced in 1916.

The blind receive instruction in music if they are sufficiently gifted, and according to their preparation and inclination are trained in typewriting, basket weaving or rope making, piano tuning, massage, telephone service; they can also run certain safe machines.

The number of totally blind in Germany from war injuries up to 1917 was less than 1000; the amount of funds contributed for their welfare was far in excess of their requirements and further giving to this purpose is discouraged.

In all ranks of society there is a strong feeling of duty to provide suitable positions for the disabled men. Almost all of the larger unions have accepted it as an honorable duty to reinstate former workmen and employees and to accept disabled soldiers as new members. A list of vacancies is given in the "Official News of Employments" and in almost all union periodicals. Besides the Welfare Commission publishes regularly, at present every four weeks, a list of positions which is sent to the military hospitals, the Welfare

Divisions of the Reserve troops, the public Employment Bureaus, to Manufacturer's Associations, the Chambers of Agriculture and to all subcommittees of the Welfare Commission. It may occur that a man may need help to meet the expenses incurred by his new trade, moving to a new town for employment or for the purchase of tools. In such cases **the Welfare Commission is ready to give the necessary assistance after investigation.** Thus the movement to restore **the lost balance of the injured and to encourage them in their efforts to become again self-sustaining, independent and forward-looking members of society is not confined entirely to organized committees but is shared in to a large extent by the entire public.**

In November, 1916, the Reichstag passed a law, which was approved by the Emperor, creating what was called the "Home Army." This measure planned to survey every man in the Empire from the age of seventeen to seventy to ascertain how much more he could do to add punch to the military arm. The rules and regulations to put it in force were being framed but had not been promulgated up to the time the Americans left Germany on February 10. This measure will release an immense amount of energy that was not being utilized; in the hospitals alone there is an average of 550,000 patients, many of whom are delayed in hospital many days and weeks waiting for the complete closure of some slow-healing wound or surface, which would not incapacitate them from rendering many important services. Whereas now, under the army regulations, they live in idleness, unless they choose to volunteer for light work about the hospital, a good percentage of these men could be doing something for the common good and hastening their convalescence as well. This war is being fought by armies each in a setting composed of all the other forces and resources of its nation and the better organized this back lift is, the stronger and longer the blows at the front will be.

ORTHOPEDIC HOSPITAL-SCHOOLS AND WORKSHOPS.

DEVELOPMENT.—The development of the military hospital-schools (Lazarettsschule) began soon after the opening of hostilities in 1914 and, fostered by the Red Cross and the Welfare Commission for the War Disabled, their aims to restore the wounded to usefulness were rapidly realized to such an extent that these institutions have become objects of interest and pride to the German people and are today the greatest new achievement in the care of the wounded brought out by the war. Statistics at the end of 1916 seemed to warrant the claim that nearly 95 per cent. of the disabled would be made self-supporting. There are no empty sleeves, no crutches and but few canes seen in Germany. Most of the graduates have not only had their industrial status restored or improved but have become better men in other respects.

As has been indicated the thought of combining a school for the disabled with a military hospital was immediately warmly received by the medical profession, by the authorities and by the Red Cross. In the joint collaboration of these forces in the Welfare Commission for the Disabled it was possible to realize such a combination in a very short time, especially in coöperation with the directors of the polytechnic schools as well as the trade fraternities and the boards of directors of municipal commercial schools.

The idea of assisting war-disabled soldiers through special hospital-school equipment and instruction in the restoration of their usefulness was not of course entirely new. There had already existed in Germany and other countries institutions for the care and schooling of cripples; their application to the care of the war disabled was quite obvious. Of course this military care is a different one as it is not limited to the disabled in the strictly physical sense but is extended to all soldiers who, without being actually crippled by wounds, yet have experienced essential changes through army service in their bodily or mental characteristics.

In some cities there already existed similar schools which had been equipped only for the one-armed. This work was pushed further at the establishment of the military hospital-schools by enlarging the scope to such an extent as seemed to be required by the kind of injuries taken care of in the ordinary military hospitals and as corresponded with the military rule regarding the duration of stay in the military hospital.

As the injured soldiers are permitted and required to remain in the army hospital only until wound-healing has occurred or as long as the medical treatment lasts, equipments which aim at the complete instruction in his former occupation of a disabled man were not considered in the beginning. Yet in time they proved to be necessary, especially as the Commission for the Welfare of the War Disabled assigned to the military hospital-schools individuals, who having been discharged as unfit for military service by the military authorities, desired a training or a retraining in an occupation.

The military hospital-school does not want to be a professional or technical school, but a military hospital-school in the proper sense, a school in which the disabled soldier finds assistance and useful knowledge during a prolonged period of treatment. The immediate field therefore for the work of the hospital-school is the orthopedic-neurologic

military hospital itself. In the first place the school serves for purposes of immediate medical treatment. It can the better fulfil its function as it is connected with the general hospitals as a special department and as it has the same official chief direction and administration as the other hospitals of the group. It supplements the usual means of treatment for the sick and fits organically into the therapeutic plan as an orthopedic-neurologic military hospital-school.

A public building with ample grounds about it, such as seminaries and other schoolhouses, Catholic institutions, and similar buildings, is selected in order to provide accommodations for several hundred patients. A specialist in orthopedic surgery is chosen as director and with him are associated a regular hospital staff of physicians and nurses to continue the medical care, besides the instructors for the various workshops connected with the hospital. The orthopedists and instructors must be men not only of ingenuity but of limitless patience in order to succeed in this work.

One of these institutions is a unit in every group of hospitals of 8000 or 10,000 beds and there is at least one complete establishment in every army-corps district. Often one thousand beds are provided in one institution for such as require orthopedic educational treatment. Two classes of injured are submitted to treatment, members of the army and discharged men. The former are assigned by military authority to the hospital, the latter by the general commander upon application to the district commander or as the result of reports of provincial Welfare Commissions.

Every patient for whom the regular military hospitals have done all they can is transferred to the orthopedic hospitals for any remaining degree whatever of physical disability which might be improved under orthopedic, medico-mechanical and occupational treatment. The class of cases treated are ununited fractures or fractures united with deformity which have resulted in disturbance of function,

bone and joint injuries followed by ankylosis and contractions, injuries and loss of substance of muscles, tendons and the integuments which may result in disability and loss of function later, such as atrophy, ankylosis and the results of extensive cicatrix formation and the paralyses. For the nerve injuries and neurologic pathologies a special department is developed which works hand in hand with the orthopedic hospital.

EQUIPMENT.—The acquisition of the costly equipment which includes every kind of apparatus necessary for the modern care of hundreds of orthopedic-neurologic cases of every kind that can follow the unusual wounds of war has been made possible through the assistance of the Welfare Commission for the War Disabled, the Red Cross and by donations from many private persons and from the various municipalities in which the hospital-school is located.

Patients are classified so far as possible to simplify administration and treatment; patients with the same injuries and diseases are placed in the same stations. Thus there are wards in which only fractures are treated; in other wards recent injuries are looked after; into still others patients go immediately after the nerve operations; there are wards for patients who have been operated on for nerve injuries and are in the period of the after-treatment; also wards for patients with slowly granulating wounds, etc. The separate wards according to the kind of treatment given therein are equipped with corresponding apparatus, electrical apparatus, contrivances for applying extension to limbs and day and night splints.

The taking of Röntgen and other photographs is necessary with most of the wounded; for this reason, well-equipped Röntgen and photographic rooms are established. A photographic division carefully preserves the records of the condition of the patient, before, during and after treatment. Preference is given to the taking of pictures which explain

the possibility of mobility and the function of a limb on one photographic plate. All Röntgen and photographic plates are copied and copies are attached to the patient's history. The future diagnosis is much facilitated thereby.

There are chemical, clinical and animal experimental laboratories. The results of the work in these laboratories and in the hospitals in general appear in numerous scientific



FIG. 70.—Exercising apparatus for leg amputation. (Radicke.)

and clinical papers. The general war literature in Germany in 1917 amounted to close to 10,000 volumes and medical literature has kept the pace.

A favorable effect on wounds of the artificial, electric noonday sun ("Höhensonne") is claimed by many and a special radiation room for this treatment is frequently established. Hot-air and steam-thermal and complete Bier apparatus are a prominent part of the system. A great number

of electromedical apparatus permits the giving of electric treatment of all kinds.

MEDICO-MECHANICAL TREATMENT.—The medico-mechanical exercises are performed in a large orthopedic hall or gymnasium. It is equipped with from sixty-five to seventy apparatus. In selecting them a number of special apparatus have been provided for the seriously injured and for the slightly



FIG. 71.—Exercising apparatus for arm amputation. (Radicke.)

injured numerous subsidiary means. The apparatus have been equal to all demands made upon them. The practicability of the subsidiary apparatus has also been demonstrated, particularly Engelhard's hip-pendulum contrivance and Herman's rocking apparatus. Very valuable assistance is afforded in the treatment of partial ankylosis by the shock or interrupting apparatus. In the treatment of stiffening of

the shoulder-joint, the arm is raised to its full extent to extend the range of mobility before exerting the force of the machine.

Special problems arise in connection with the orthopedic treatment of those with amputations, a prerequisite to the correct use of an artificial member. In the case of a stump whose musculature has become atrophied because of lack of



FIG. 72.—Hot-air treatments. (Mannheim.)

exercise and whose function has been restricted the man is often dissatisfied with his prothesis, because it annoys him or does not give him sufficient support or it may seem too heavy or is not sufficiently manageable. Experience has proved that all these discomforts disappear after continued use of the artificial limb but that at first the cause of them is sought in the imperfections of the prothesis and not in the lack of preparation and exercise on the part of the injured man.

For this reason the necessary preparation of the stump cannot begin too soon and should be started, even though for some reason or other the patient is bed-ridden. In this preparatory treatment mobilization of the joints is a most important feature of the treatment; this is attained by massages, hot-air treatments, active and passive movements, extensions and pounding of the stump with the hand to



FIG. 73.—Stump cuff arm. (Radicke). To produce a bulbous stump end, preparatory to applying a prothesis.

toughen it. The patient is required to exercise his stump by himself on all the apparatus as much as possible. Results will depend upon the length of the stump; in some cases the assistance of a masseur becomes necessary. After adjustment of the prothesis exercise must be continued. Various forms of outdoor exercise are also employed.

With the immense amount of work which developed in the medico-mechanical department of a large orthopedic hospital

there is a danger of failure in exactness and system in carrying out the exercises and other treatments for each patient. To guard against this by frequent visits and thorough examinations during the courses is the duty of the attending physician. To exercise a perfect control over the execution of the prescribed measures, each patient is provided with a

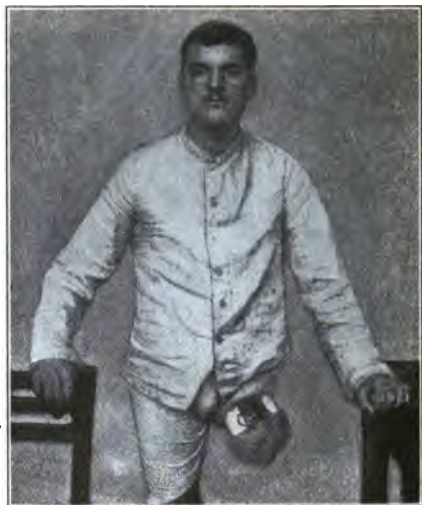


FIG. 74.—Stump cuff. Thigh. (Radicke.) To produce bulbous end, preparatory to applying an indirect weight-bearing prosthesis.

treatment card showing the various treatments and exercises ordered for him, when they are to be carried out and in exactly what manner. Amputations of all kinds are often transferred to a special orthopedic hospital which specializes in the development of one-legged and one-armed men.

The treatment of the stump after the application of the

medico-mechanical treatment is the following: A tight cuff is adjusted a short distance above the end of the stump to produce a narrowing at that point and to bring on an enlargement of the end of the stump. A little later a layer of plaster



FIG. 75.—Finger flexion in Thilo's glove. (Radicke.)

of Paris is applied over the cuff and the prothesis attached; the enlargement helps to prevent the stump from slipping out of the prothesis. Toughening the lower end of the stump

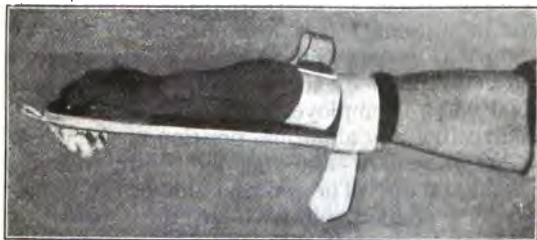


FIG. 76.—Finger extension in Thilo's glove. (Radicke.) Brandenburg.

is not necessary because of the construction of the prothesis. This has made it possible to provide every patient with a temporary artificial limb for immediate use. The patient is most benefited both subjectively and objectively by an appa-

ratus which enables him to become active as soon as possible. Work is without doubt the best form of treatment. With the exception of a few cases which seem to baffle every method of treatment but few cases of painful stumps have been observed which do not respond readily to antineuralgic methods.

Other cases in the hospital are those of false joints, severe joint diseases, paralysis and injuries of the vertebral column. Lighter cases are treated in such a manner as will make them equal as soon as possible for the military requirements of light garrison duty.

Operations are of rare occurrence in these hospitals. Patients are often reluctant to submit to an operation because of a previous long hospital confinement and on account of their dread of being again bed-ridden and exposed to post-operative dangers. Bloodless surgery therefore finds here a wide application in the restoration of the function of an injured part.

In order not to interfere with the attendance of cripples in the various courses of instruction the manifold apparatus employed in stationary treatment are much used at night. Thilo's glove (Fig. 76) is used to good advantage in cases of slight contraction of the fingers. The appliance illustrated in Fig. 75 is employed in more serious cases; it also aids in correcting any abnormal position of the wrist. Contractions of the elbow- and knee-joints are treated with a rubber-band tractor. The extensor side of the arm or thigh is bound to a padded splint. Thus the forearm or leg is extended and drawn more closely to the wooden splint. A rubber band around the upper and lower arm or around the lower extremities effects the process of extension. Another very simple method for the purpose is that of attaching a sand-bag.

For the stiffening of shoulder-joints a stationary apparatus treatment involves great difficulty; the application of Schede's

apparatus also has been of little avail. For it has been substituted a plaster and board splint which by means of a screw provides for increasing the abduction.

An elastic spring tractor is to be recommended in the treatment of drop-foot. Contractions of the hip-, knee- and ankle-joints are redressed and provided with a plaster cast. The great army of sufferers from flat-foot find relief in celluloid insoles with steel reinforcement or in cork and leather supporters fashioned according to a plaster model of the foot. The correction of flat-foot by this method gives very good results. As for durability, a combination of celluloid with the steel reinforcement is at least as resistant as the easily oxidizing metal.

In depression of the metatarsal arch indicated by pronounced pain under the heads of the second and third metatarsal bones special attention is paid, in preparing a model, to the anterior-transverse arch. A tong-shaped extension runs from the arch support beneath the sole leather to the head of the metatarsus so as to elevate the forepart of the arch of the foot. In especially severe pain complete relief of pressure must be given beneath the head of the metatarsal bone.

Injuries of the vertebra column are sometimes kept immobilized in a plaster bed. Later, a corset of plaster or celluloid and eventually a jury-mast and a light corset of cloth and steel are applied.

OCCUPATIONAL TREATMENT.—"Occupation" therapy begins as soon as possible. Practical participation in the school serves not only to increase the flexibility of joints and tissues, the usefulness of which has been reduced by ankylosis or paralysis, but is also of inestimable value in overcoming the numerous psychic neuroses developed in modern war. The actual medical treatment of those who are confined to bed takes only a few hours during the day. There is danger that the enforced inactivity will impair the spirits of the otherwise healthy men and paralyze their energy and desire to

work. Here some suitable occupation is a beneficial and very necessary antidote. The school offers the possibility of work of such kind not only as a diverting occupation but in a manner which, at the same time, offers each one some immediate economic advantage. The men can fill the gaps in their previous general or special vocational education and satisfy their desire of adding to their knowledge and mechanical training. The theoretical instruction in the elementary branches in the industrial and commercial fields especially contributes to this end. As a consequence a man who is disabled for the practical work of his calling may, with his increased technical knowledge acquired in the school, be enabled to return to his former trade and place of employment in a higher and better-paid capacity.

GYMNASTIC TRAINING.—The Coblenz Orthopedic Hospital-school in the Barmherziger Brüder Hospital which is in a large park began its work early in 1915 and erected an additional building for the workshops as well as for the wholesale manufacture of artificial limbs and supports. The latter activity alone employs over 100 expert workmen. In this school, before inducting the men into their chosen occupation, it is their policy to give a thorough training in all kinds of bodily exercises in the large gymnasium connected with the institution. Each amputation case with a healed stump receives his learning apparatus, leg or arm as the case may be. Leg cases receive every morning walking instruction with their provisional prothesis and always without a cane. After overcoming the initial difficulties they are practised in stair climbing, and obstacle walking, etc. Turning instruction begins in the morning with jumping without the prothesis; first by the running broad jump and the high jump; nearly all succeed in the one-meter high jump but only after considerable practice can a one-legged man make 1.40 meters. Then follows jumping with the prothesis. This is followed by all regular turning exercises on horses, racks and bars with and without

prothesis. In the afternoon, games such as stone hurling, ball playing, bicycle riding, bowling, etc., are engaged in.



FIG. 77.—Class walking exercise with provisional prothesis.



FIG. 78.—Squad exercises with obstacles. (Coblentz.)

Twice a week rowing and swimming for amputated cases occurs. The arm amputations are particularly exercised in free exercises without apparatus, club swinging, drilling with staff and stone throwing. All gymnastic instruction is by military word of command. If there is any time left after these courses it is devoted to work in the shops. The gymnastic scheme of instruction is not only to educate the bodily skill and dexterity but above all is intended as a schooling



FIG. 79.—Hurdle jumping with prostheses.

for the will-power. The great majority of amputations are not those who have lost a limb soon after the injury but are patients who have spent weeks and months in a sick bed, during which time attempts were made to save the limb, the amputation being resorted to finally as a life-saving measure. These people are not only shattered in body but in spirit and must be awakened to a new life. A sharp watch is kept for incipient tuberculosis and other constitutional diseases.

COURSES OF INSTRUCTION.—The final work of the school is the training of the disabled for their future livelihood. As indicated elsewhere it is agreed that as much as possible, they shall be trained for the vocation previously followed and in the great majority of cases this is possible. In many cases a man's disinclination to take up the former work is due only to lack of will-power, energy or ambition to overcome his handicap. Under the direction of carefully selected vocational advisers, teachers and physicians these handicapped men have an opportunity to conquer their difficulties by increasing their will-power, in gradually overcoming the disability of their injured limbs by new contrivances, by special suitable tools and by training their accessory muscles and other limbs. Often the mere attempt at resuming the former work restores self-confidence and the invalid gradually becomes again competent to carry on his old occupation either wholly or with a slight decrease in efficiency. It is indisputable that without the strong psychic support of the school many a disabled man would be lost to his vocation to his own detriment as well as to the disadvantage of the State and would also probably not be able to make a living in another occupation and would very likely become a burden on his family or upon the community.

Even in cases in which a partial or entire change of vocation cannot be avoided and a retraining into a special branch of the old occupation or education for a new vocation may be necessary, the coöperation of the orthopedic hospital-school is essential. Ordinary military hospital treatment followed by immediate vocational training outside of an orthopedic school department has been found unpromising. The men much prefer the hospital shops. The chief reason for this is that they work side by side with their comrades and that they are not obliged to compete with younger or normal workmen whose staying ability surpasses theirs and whose rapid progress and success are apt to be depressing to

the handicapped man. If, for instance, a one-legged man in a large factory, surrounded by the physically competent, were to become tired it would be rather discouraging to him to give up even temporarily and to see others around him able to continue their work. On the other hand, in the special hospital workshops he can tell his troubles to the doctor who sympathizes with and is familiar with his physical limitations and working ability and who will understand and encourage him. In this way and through the stimulation of the instructors and the nurses, who in the orthopedic hospitals are very carefully selected, he gradually becomes used to harder work until a sound foundation is laid in his vocational training.

The continuation and completion of his instruction can if necessary be carried on in special establishments annexed to the school outside the military hospital system. For this the training courses of the technological institutions and trade schools are available and in many cases have been opened to war invalids by the establishment of special classes solely for them. Large industrial concerns have consented to take without remuneration, hundreds of war cripples into the blacksmith shops, workshops for machinery and carpentry and to train them according to their adaptability so that they can find suitable work either in this same concern or in other plants.

The following is a description of the general arrangement of the excellent hospital-schools at Mannheim: From the time of their foundation until November, 1915, the schools were establishments of the local Red Cross chapters. The entire cost of founding and managing them was met by these chapters. By special arrangement with District Committees for the Welfare of the War Disabled, the latter have now taken charge of the schools and they have become a part of the National Commission for the Welfare of the War Disabled. The Red Cross shows its lasting interest in the schools by continued financial contributions.

The management of a school was at first in the hands of a special Hospital-school Committee which consisted of the chairman and one member of the hospital board of the Red Cross, two leading physicians and the director of the local trade school. Now it rests in the hands of a specially created subcommittee of the District Welfare Commission for the Disabled. This subcommittee consists of the hospital-school committee and the following: (1) The chairman of a subcommittee for looking up and teaching disabled soldiers, who is also chairman of the Red Cross; (2) the chairman of subcommittees on finance and education; (3) the physician-in-chief of the city hospitals and (4) the executive committee of the city commercial school.

The choice of subjects corresponds to the previously mentioned aims of all these schools.

In the first place it was necessary to give in the first division of the school such theoretical knowledge as seemed particularly desirable for the wounded who came from practically all professions. This included on the one hand general subjects, valuable alike for all professions, and on the other, professional subjects necessary for the proper pursuit of a special trade.

In determining the various courses it was necessary above all to consider the needs of the wounded. They were decided upon after a questionnaire had been circulated among the injured.

With professional help the following courses were arranged:

A. General: (a) writing and arithmetic, (b) shorthand and typewriting, (c) English and French.

B. Special courses for (a) building trades, (b) metal trades, (c) commercial professions.

The second division of the school consists of practical instruction in the workshops. Workshops were established for carpenters, shoemakers, locksmiths, smiths, truss and bandagemakers and bookbinders. For the purpose of sup-

plementing the orthopedic after-treatment, instruction in modelling was introduced. A workshop for paperhangers is provided whenever a sufficient number of applicants warrants it.

The instructors in the theoretical subjects are state-licensed teachers. The management of the instruction in the trades is given to competent masters; in bookbinding and modelling women with a thorough professional training have given their services.

Membership in the hospital-school is open to any injured soldiers, particularly the inmates of the war hospital, members of the convalescent companies and the soldiers discharged as unfit for service. Naturally the largest number by far is drawn from the inmates of the hospitals.

Compulsory enrollment exists only in so far as it is ordered by the doctor for the purpose of completing a cure. However, after enrolling in the school, attendance is absolutely demanded. The control thereof is exercised by the military authorities.

The choice of a course is left to the individual provided it does not meet with any objection on the part of the physician or professional management.

The school hours have been arranged generally for the forenoon in consideration of the orthopedic treatment and the daily noonday walk. The chart at the end of this chapter shows the arrangement of the lesson periods.

All class rooms are in the hospital. One can easily see the advantages therein for the medical supervision and influence upon the choice of work, military control and finally for the wounded in the orthopedic-neurologic hospital division.

THE VARIOUS SUBJECTS AND WORKSHOPS.—I. Writing, three hours per week. Instruction comprises penmanship and spelling, introduction to commercial and industrial correspondence, simple letters of price-lists, orders, offers,

receipts of orders, notices of filling orders, notices of receipts of goods and credit, bills and receipts.

2. Arithmetic, three hours per week. The four fundamental principles of arithmetic with practical applications, casting out nines, fractions, moneys, weights and measures, final accounts, chain rule and its most frequent applications, percentage and income calculations.

3. Writing and arithmetic for wounded with little preparation, three hours per week. The course of study is in the main as in 1 and 2 with suitable limitations.

4. Shorthand, three hours per week. Introduction to the methods of Stolze-Schrey according to the methods of Puff and Stark. Dictation and reading. Reading of dictation, speed drills and foreign words.

5. Typewriting, three hours per week. Touch drills, exercises according to the ten-finger method with the use of covered keys; word drills in single rows and combination; capitals, numerals and signs; commercial letters from dictation; markings; heavy type and wide-spaced words; underlining; exercising in spacing and paragraphing; use of the tabulating key; care of the machine. For the use of students new typewriters are furnished.

Remarks on 1 to 5: All professions are represented in the above courses; farmers, manufacturers, laborers, officials, teachers, students, writers, technicians, merchants, railroad men, active non-commissioned officers, musicians, etc. In consideration of the difference in the nature of the injuries and the physical disabilities and in the amount of preparation the pupils have had, individual instruction often takes the place of class instruction. This is particularly true of writing and typewriting. The pupils whose right hands had been injured were forced to do their writing exercises with their left hand. The results were extremely encouraging for in a few weeks the handicap had been overcome.

6. English and French. (a) Course for beginners, two hours per week. Subject matter consists mainly of grammar with exercises in translation and conversation. Those who join the classes later, or those who fall behind on account of furloughs or operations, are brought up to class by special instruction.

(b) Courses for advanced students, one hour per week. Instruction consists of conversation, dictation and composition; occasionally grammar and reading from magazines and books. It was found necessary to arrange two courses on account of the difference in the previous education of the students. There are college graduates and men who have lived many years in foreign countries; there are men who have had only a common-school education and who have probably never heard a foreign word until the war brought them into contact with foreigners. Friendly consideration and help on the one hand and energetic effort on the other have often succeeded in bridging over the difference. In fact, the advanced pupils are always ready to help their weaker comrades. As a rule the work is good. The classes consist mostly of merchants, prospective merchants, teachers, workmen and men who live in districts where a lively correspondence is maintained with foreign countries.

7. Courses for the building and metal trades, each nine hours per week. Subjects included:

(a) Arithmetic for both divisions; square and cubic measure, weights and material calculations, with drawings and sketches as a basis for computation of cost; use of tables, comparative and final calculations, computation of weights and cost, allowing for breakage, waste, shrinkage; computing of variations, original cost and overhead charges; percentage, rebate, discount, settlement of accounts, commission, interest, profit and loss, depreciations and increase expressed in percentage and ratio; division and alligation; examples in interest; simple lessons in mechanics.

Special for building trades: Measurements of various joints; various instruments of measure and their use and care; simple calculations of solidity and density.

Division for metal trades: Calculations with formulæ, computations of speed, translations of pulleys and cogwheels; electrical units of measurements and calculations; proportion and its technical application.

Explanation of the following terms: Mechanical work, effect, horse-power and atmospheric pressure, electrical energy; calculations of simple elements of machines and apparatus; electrical conduction, resistance and friction; magnetic forces and lines.

(b) **Science of materials:** General for both divisions. Discussion of the raw material; semimanufactured material and material for consumption; occurrence, extraction, manufacture and use with consideration of their physical, technical, esthetic, hygienic and economical properties; their final form and prices; choice of materials; physical and pathological defects; prevention and cure of these defects; tools.

Building trades: The regulation of the building trades regarding permissible demands of materials, tests for density, solidity and capacity, increase of solidity of concrete through iron inlays; reinforced concrete.

Metal trades: The most important methods of joining in machine building, welding, soldering, riveting, etc.; lubricating material; discussion of the required tools and machinery; the forms of tools being dependent on the properties of the materials, their effectiveness, use and care; measures and instruments of measure, patterns and rules.

(c) **Business and composition:** Business letters; regulations taken from the civic code and commercial law; managements of deeds and documents; notices and reports to the authorities; judgments; collections; means of payment, money, checks, draft and credit. Description of various technic of work. Accounts current.

(d) Bookkeeping: Importance of bookkeeping; workshop bookkeeping; keeping time cards and wage lists; taking of inventory and entry of each event into the day book according to the double entry system in columns; their transfer into the charge and delivery books; closing of books; calculations of profit and productiveness; ascertaining of taxable income; declaration of taxes.

(e) Calculations of costs: General discussion of calculations; ascertaining of annual expenses of the administration of business, of the running expense of power and work machines; calculation and valuation of working hours; fixing of cost and selling prices; making allowance for wages and profits; setting up of cost calculations from given plans and original drawings; rough calculations of cost; contract bids.

(f) Economics and civics: insurance system; trade guilds, cause, purpose and aims thereof; classification of trades, organized labor, boards of trades, their problems, factory inspection, courts of trades, insolvency, contract systems; constitutions of the German Empire and the students' particular provinces: forms of government; law-making bodies; problem of the States; rights and duties of citizens of State and parish; organization of the civil authorities; finances of the State; State and church taxes; parish assessments; relations of the State to the churches and religious societies.

(g) Technical drawing, building trades: Simple models in pencil sketching and various designs; putting in measurements; isometric illustrations; drawing of geometrical theorems from isometrics, and *vice versa*; determination of actual size; solving of easy pertinent problems serving as an introduction to technical drawing; sketching of simple constructions used in various trades; making of drawings for tools on small scale and in actual size.

In mechanical drawing, group and class instruction were impossible, considering the various degrees of preparedness

of the students. For instance, while an advanced architect was able to plan country homes, beginners were obliged to learn the fundamental principles of mechanical drawing. This same allowance was made in the instruction in the other branches as well.

Metal trades: Simple models and designs in pencil; putting in measurements; isometrics; the most important problems; determination of actual size.

For mechanics and machinists: Sketching, with measurements added, of different parts of machinery; blueprints from drawings; taking apart of separate parts of machinery from sketches; drawings of parts in actual size for use as shop drawings; calculation and construction of cogwheels.

For patternmakers and molders: In drawing, parts of cast machinery; making of drawings of models with measurements allowing for contraction; considering the taking apart and putting together parts of the model and according to the sketches and outlines; molding of models; drawing of patterns for pattern making.

For electricians: Individual parts of electric machinery and apparatus in drawing and blueprints; generators and motors; electric bells and telephone instalments; light and power installation; distribution of current; conduction plans; plans for magnetic and induction coils; switchboard building; comptrollers.

Among the pupils in the building trades department there were architects, masons, railroad men, concrete technicians, stucco workers, joiners, glaziers, builders, locksmiths, smiths, tinsmiths, shinglers, carpenters, gardeners, sawyers, flint glassworkers, brushworkers, brushmakers, engravers, bakers, shoemakers and chimney sweeps.

In the metal trades department there were mechanics, machinists, locksmiths, ironmongers, boilermakers, miners, electrical installers, electrical engineers, molders and patternmakers.

Rigid methods of instruction could not, of course, be closely followed due to the diversified and the changing aspect of the classes. To make the instruction inspiring and interesting it was given in such a way that a practical problem was handled thoroughly by the use of all the branches of study.



FIG. 80.—Orthopedic hospital workshop, Graudenz. (Heubach.)
Cabinet making. Personal communication.

8. Commercial courses, one hour daily. Importance of commercial bookkeeping; taking of various steps in a business according to the American method; business routine in simple bookkeeping, German; double entry booking for a colonial warehouse.

9. Cabinet making, three hours daily. The workshop was placed in the room of the manual training in the "Real

School" corresponding to our manual training and technical high school. It possesses six single and five double benches with full equipment of tools. These were loaned in part by the manual training department, in part by private individuals, and the rest was bought by the Red Cross. In consideration of the injuries and the inexperience of the



FIG. 81.—Hospital workshop for machinists, Graudenz. (Heubach.)
Personal communication.

students the tools were provided with safety appliances. The shop often receives substantial support from various local lumber firms who furnish the required lumber free of charge. The instruction is dependent on the nature of the injuries and the profession of the man. Each individual uses each tool in succession, thereby avoiding strain and stimulating mental interest. The preliminary work consists

of the construction of parts used in the trade with various combinations of framework, putting together boards by rabbets, pegs and dovetailing. After a time small objects are made, using the various methods, sleeve boards, dressing cases, flower boxes, etc. All objects are made from drawings, thereby giving the pupils some theoretical knowledge as well. Gifted pupils are after a short time able to construct larger and more practical pieces of furniture. As a rule only useful household articles are made. Large pieces are class problems in order to familiarize all with the process of setting up the large pieces of furniture. Articles of use for hospitals are often made, such as arm and hand splints and apparatus for extensions. However, although these are of practical value, the hospital does not see therein the chief aim of the school. Its primary and noblest purpose is the physical and mental development of the pupils. It wishes to aid in the betterment and healing process of the men and considers the making of the objects as secondary in importance but does not deny the moral and educational influence of such work.

The pupils in these classes have, in the majority of cases, injuries of hands and arms. Their employment in the shops is of special value. There are not only cabinet-makers but students from all walks of life. The spirit and enjoyment of work in this department are especially worthy of mention.

10. Locksmith shop and smithy and division for truss-makers: A special barrack in the courtyard has been erected for this shop. It is fitted out with two forges, three benches with room for eight each; fourteen vises; two anvils, one small and one large lathe; one cutting machine; one boring frame; one pair of stock shears for cutting tin and various small tools. This building and its equipment is furnished by the Red Cross.

The pupils are instructed in fashioning iron and other

metals according to the hot and the cold process, through hammering, punching, embossing, scouring and forging. In the more advanced classes and later more complex objects with ornamentation are made, such as candle holders, smoking sets and army plates. The classes are recruited from the most varied professions. They are, however, arranged particularly for those who have stiff or crippled hands or whose muscular strength is to be restored.

In the division for truss making, in which there are chiefly those who are by trade locksmiths, instrument makers and artificers, orthopedic apparatus are made. Under the supervision of commandeered professional trussmakers, the necessary trusses, orthopedic apparatus and parts are made for the orthopedic and other local hospitals as well as for convalescent companies. In this way the division meets to a great extent the needs of the hospital for orthopedic apparatus made under medical supervision.

11. Shoe-making shop, three hours daily: The equipment contains besides the required tools a sewing machine, leather belt and the necessary lasts. Of particular benefit is a bench which enables men to work whose injuries or defects are such that they were unable to work while sitting. Experienced shoemakers make orthopedic boots; all shoes required by the local hospitals and troops are made in the shop. Pupils belong to various trades such as miners, masons and farmers. The instruction consists of simple lessons in the making of cobblers' thread and sewing, advancing so far as time and the ability of the students will permit. Many were able at the time of their dismissal to do their own repairing and some were even more advanced. The rapid progress of those with lame fingers and hands was remarkable.

12. Bookbinding, three hours daily. The workshop is equipped with all tools necessary for the simple problems (Fig. 82). As a rule the classes are attended by men of other professions, particularly those with hand injuries.

Generally the course of study, methods and limits of training are fixed by the trade school. Lessons are given in cutting, covering and lining with paper and cloth; then sewing at the sewing press as well as on tape; binding in pasteboard, half-board, half-leather and full-leather; also mounting of folded maps. Writing desk outfits and waste baskets are



FIG. 82.—Bookbindery. (Mannheim.)

made and square, round and oval boxes with partitions, also picture framing with linen, cloth or leather.

13. Modelling, nine hours per week. The particular purposes of this shop as a means for after-orthopedic treatment have been mentioned before. The advantages of the massage incidental to the kneading of the clay with both hands are apparent. As a therapeutic problem one can readily see the work must be made interesting,

stimulating and free from all class-room supervision. Only unobtrusive supervision and instruction seem advisable. The right choice of objects for the collection of models is



FIG. 83.—Modeller carving hospital Director Heubach in wood.
Personal communication.

important. It comprises: (1) Simple geometric forms (use for vases, pots, ash trays, etc.). (2) Simple and rich ornamentations. (3) Nature objects: flowers, leaves, fruit, stuffed animals and animal casts, etc. (4) Simple features

casts, skull, nose, mouth, face, etc. Occasionally useful objects are made, such as frames, ash trays, paper-weights, etc. Several of the pupils have advanced so far that they make scientific models, as for instance of anatomical subjects. It is noticeable that all hospital pupils strive to do their work with painful neatness.

PROGRAM OF CLASSES IN A HOSPITAL-SCHOOL.

Subjects.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Building trades . . .	9 to 12	.....	9 to 12	.....	9 to 12	
Metal trades . . .	.....	9 to 12	.....	9 to 12	.....	9 to 12
Bookkeeping . . .	9 to 12	9 to 10	9 to 10	9 to 10	9 to 10	9 to 10
Typewriting . . .	.....	11 to 12	.....	11 to 12	.....	11 to 12
Shorthand . . .	.....	10 to 10	.....	10 to 11	.....	10 to 11
Writing . . .	10 to 11	.....	10 to 11	.....	10 to 11	
Arithmetic . . .	11 to 12	.....	11 to 12	.....	11 to 12	
German and arith- metic . . .	.....	5 to 6 P.M.	.....	10 to 12		
French . . .	.....	5 to 6 P.M.	.....	8 to 9	.....	8 to 9
English . . .	.....	4 to 5	.....	.....	.....	9 to 10
Joinery . . .	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12
Locksmith . . .	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12
Shoe making . . .	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12
Bookbinding . . .	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12	9 to 12
Modelling . . .	9 to 12	.....	9 to 12	.....	9 to 12	

ARTIFICIAL LIMBS OR PROTHESES.

THE orthopedic care of the war disabled presents an immense number of new problems in the construction of artificial limbs, in the solution of which work is continually being done. The discoveries of Hoeftmann, Fleming and others attest the possibility of restoring to those who have suffered the loss of both hands and feet an ability to work and to earn an independent livelihood. The large number of amputations make demands for artificial limbs which must be simple in structure, durable, easily repairable and beneficial to the disabled. In general it can be stated that in the consideration of the principles of artificial leg construction, aside from the question of the stump being able to tolerate weight, there are unimportant differences. It is now possible to provide the disabled with artificial legs that render them good service and that enable them for instance to stand all day at such work as that of a machinist.

As already indicated it has been found very advantageous to have recourse to provisional artificial limbs, so as to get the disabled in condition to begin work as soon as possible. The patient must walk successfully with the provisional limb before he receives his second, final limb. The former serves also on later occasions as a substitute when repairs of the permanent apparatus become necessary.

The provisional artificial limb for the thigh is a simple apparatus with a padded ring-seat capable of adjustment, a knee-joint that can be made stationary, a fixed ankle and

a flexible foot. Those with amputations must be taught to walk correctly with the toes always to the front from the



FIG. 84.—Adjustable walking stilts for beginners after amputation.
Crutches are never used.

very beginning. Experience proves that a wooden leg or an artificial leg without a flexible knee-joint makes a bad beginning. Flexible knee-joints must be used by the patients

from the very first and only on rare occasions when long standing or walking may be tiring should the joint be made rigid, or locked.



FIG. 85.—Hospital or provisional prothesis with the use of the Vienna plaster socket. (Heubach.) Personal communication.

At first the artificial limb for the thigh resembled Hoeftman's apparatus, which avoided the disagreeable strong spring of the leg caused by a sitting posture. The disabled



FIG. 86.—Correction of a hip contraction. (Heubach.) Personal communication.

were dissatisfied with the inflexible foot, consequently a flexible one was substituted. A spring pad in place of the



FIG. 87.—Application of a hospital prosthesis while preserving the balance with supports. (Heubach.) Personal communication.



FIG. 88.—Hospital workshop for tailoring. X, patient sitting on a scoliosis seat. (Heubach.) Personal communication.



FIG. 89.—Orthopedic hospital workshop, Graudenz. (Heubach.) Basket making. Personal communication.

rubber pad, which can be replaced later, was necessary on account of the shortage of rubber. The same foot is common to the provisional limbs for both legs and thighs. Lateral splints for indirect pressure are fastened to a metal shackle confining the tuberosities of the tibia. A heavy pad in the front and back of the shackle supports the bones of the leg.



FIG. 90.—Leg and thigh amputations with provisional prostheses incorporated in plaster-of-Paris sockets. (Heubach.) Graudenz.

The padded stump carries little or no pressure and broad rubber bands assist in the elevation of the leg.

The construction of the artificial arm offers a greater problem, the solution of which is yet unsolved. It is evident that until now an artificial arm served principally to conceal the disagreeable impression produced by the loss of a limb.

It is questionable if a so-called universal arm is available for all kinds of work. At least special arms for the various vocations of industry, agriculture and metal work can be manufactured. Recent inventions have contributed consid-



FIG. 91.—High amputation of femur; use of the provisional hospital prosthesis and plaster-of-Paris socket. (Heubach.) Personal communication.

erably to progress in the manufacture of artificial arms, and they prove that the question of construction of a useful artificial limb can only be solved from a technical point of view. The attempts to imitate the anatomical structure of the arm and hand have been unsuccessful. Just as the suc-

ness of flying machines has been contributed to by a disregard of the bird's movements so we can expect results only by forgetting to try to imitate the anatomy of the arm. After many and various experiments for an arm the simplest form of artificial limb was found best for ordinary purposes.



FIG. 92.—Group of arm and forearm amputations with protheses.
(Heubach.)

For the forearm amputations a good work-limb which can be attached directly to the stump is advisable. This same principle holds good for the arm amputations. The shoulder-joint through the elbow-joint and the stump must substitute the functions of the forearm, and the less mechanism between the shoulder and the end of the prothesis the better. To be sure these protheses must be provided with joints, which, however, must be placed as close as possible

to the end of the stumps. It is not impossible that, by careful computation of energy, it can be ascertained what relation ought to exist between the length of a working limb and the length of the stump, in order to use the stump to the best advantage.



FIG. 93.—Arm and forearm amputation with prostheses according to Rothe. (Heubach.) Personal communication.

The attachment of a prosthesis to the shoulder is very difficult; it is often so loose that the stump easily slips out, giving the impression of a useless attachment. An attempt has been made to correct this fault in cases of exarticulation of stumps too short to allow the raising of the arm, by encasing the stump, the acromium inclusive, in a carefully fashioned leather cap, which is secured to the upper part of the prosthesis. The entire contrivance is then securely fastened to



FIG. 94.—Arm prosthesis for eating. (Radicke.) Brandenburg.



FIG. 95.—Forearm prosthesis for eating. (Radicke.) Brandenburg.



FIG. 96.—Temporary prosthesis for hospital use for arm cases: sockets of plaster of Paris. (Radicke.) Brandenburg



FIG. 97.—Definitive and provisional prostheses for leg and thigh. (Radicke.) Brandenburg.

the shoulder by means of a bodice. This permits the transmission of a free muscular movement of the shoulder to the prothesis.

Another difficulty in fastening an artificial arm to the shoulder may be shoulder-joint rigidity that does not allow elevation above the horizontal. This condition calls for



FIG. 98.—Definitive and provisional prostheses for leg and thigh.
(Radicke.) Brandenburg.

careful attention, as whatever mobility there may be must be preserved. An attachment which hinders the shoulder movement increases the loss of function. An arm must be so constructed as not to interfere with the shoulder-joint and thereby complicate the possibility of attaching a serviceable elbow-joint. A steel or leather casement serves to combine both usefulness and good appearance in the artificial arm.

In the reserve hospitals the sufferers from injured nerves often showed spontaneous improvement, and operation is not always necessary. In addition to motor disturbances, sensory disturbances, trophoneurosis and pains in the wounded limb are very common. Protheses are very useful in nerve paralysis. In order to improve cases of radial

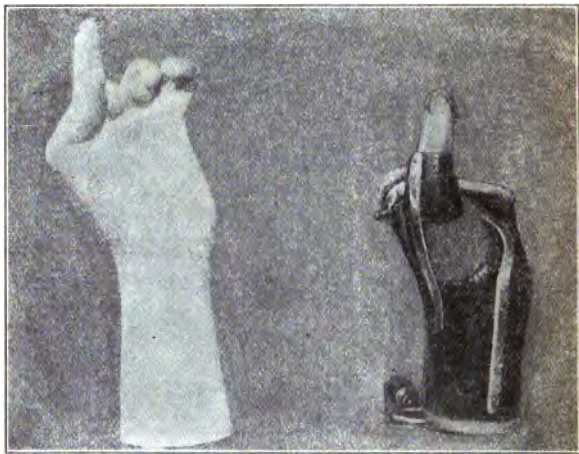


FIG. 99.—Apparatus for loss of thumb and deformities of fingers.
(Radicke.) Brandenburg.

paralysis an easy extension position must be substituted for the flexed position. In less serious cases a support for the wrist suffices to restore marked ability for many kinds of work. A painful hand is such a hindrance to work that attempts have been abandoned to provide such cases with artificial appliances. Instead the fists are clenched and encased in a socket.

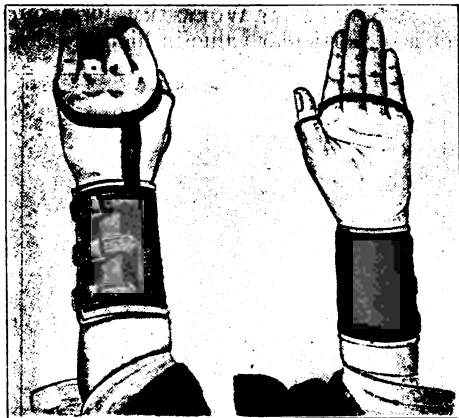


FIG. 100.—Support for musculospiral paralysis. (After Heymann.)



FIG. 101.—Support for musculospiral paralysis; made from wire splint material.

THE SIEMENS-SCHUCKERT WORK-ARM, for manual workers and laborers, is of particular value in high arm amputations.



FIG. 102.—Gunshot wound of spinal cord. With prothesis learning to walk with one-handed support. (Heubach.) Personal communication.

There are many attachable parts adapted to the various requirements of the many trades, but the arm mechanism

itself is always the same. The firm making this apparatus has developed it not as a commercial proposition but as a contribution to the war injured, and sells it at cost. The use of the work-arm must be learned under the direction of teachers or failure will result. It does not take the place of the ordinary artificial arm or prothesis as it is purely a



FIG. 103.—Brandenburg work-arm in wood carving. (Radicke.)

working tool whose use must be mastered the same as that of any other tool. The illustrations of workmen using it are from cases which have learned their trade and are made from photographs taken while at their work. As fast as improvements are made they are published and sent to all owners of the arm. Through its use a workman can accom-

plish from one-half to two-thirds the work of a normal man, and under especially favorable circumstances more than this.

The arm should be used solely as a working tool and not as an ordinary or a cosmetic prosthesis; it should be worn over the clothing, in the simplest manner and should be put on and adjusted without assistance; the exertion of force



FIG. 104.—Brandenburg work-arm in wood carving. (Radicke.)

should, so far as possible, be transmitted by the sound part of the shoulder; the stump part does not serve to support the harness or other attachments of the apparatus and needs no bandaging, etc. The range of motion of the stump should be unimpeded to its fullest extent; the same work-arm serves either as a left or a right with slight alterations; it is

readily mastered and easily cleaned; it is very strong, durable and reliable; all parts are made of steel and iron, except the shoulder ring, which is of pressed aluminum, and the leather and soft parts for its attachment to the body; for those of great muscular development a special sized shoulder ring is made; all other parts are standard. The amputation



FIG. 105.—Brandenburg work-arm. (Radicke.)

stump retains its full mobility. The shoulder-joint of this work-arm cannot be exerted in every direction when in a certain position, as it does not functionate at times in the horizontal plane forward or backward, but a slight inclination of the body suffices to overcome this. The Siemens-Schuckert firm, of Nürnberg, publishes a complete description of its apparatus. Figs. 106 to 145 illustrate this apparatus.

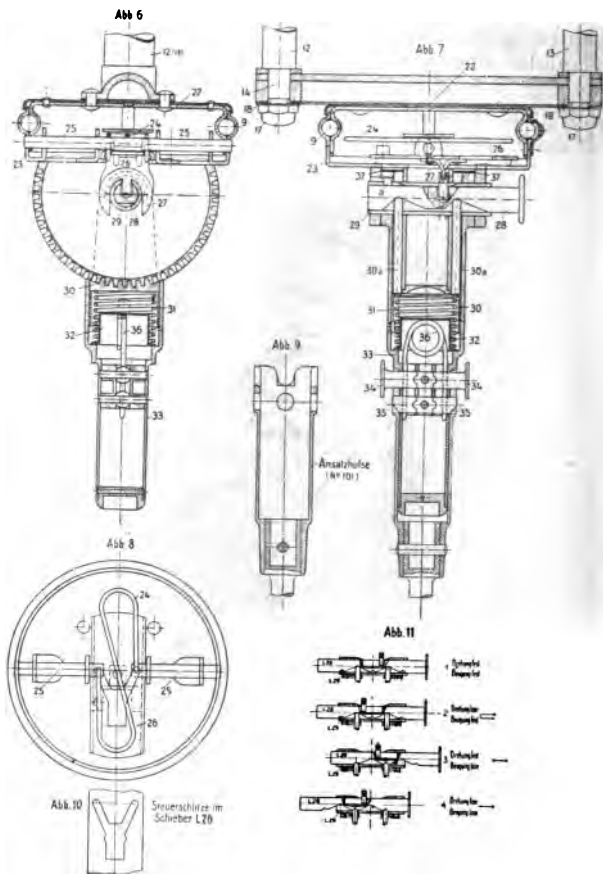


FIG. 106.—Joint of the Siemens-Schuckert work-arm for arm stump.



FIG. 107.—
Tool holder.

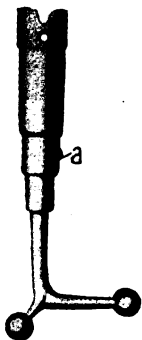


FIG. 108.—
Double ball connection.



FIG. 109.—
Single ball connection.

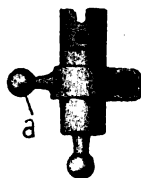


FIG. 110.—
Shortened ball connection.



FIG. 111.—
Carrying hook.



FIG. 112.—
Holder for auger.



FIG. 113.—
Hand brush.

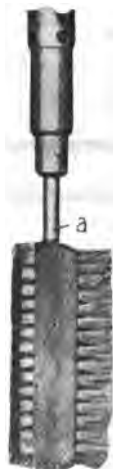


FIG. 114.—
Wooden hammer.



FIG. 115.—
Pressure bowl
with flange.



FIG. 116.—
Toothed
presser.



FIG. 117.—
Rubber
presser.



FIG. 118.—
Roughened
presser.



FIG. 119.—
Nail
holder.

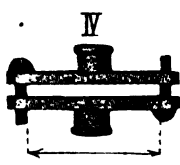
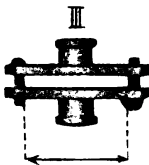


FIG. 120.—Rigid file holders.

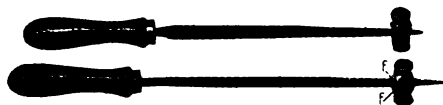


FIG. 121.—Profile files attached.



FIG. 122.—Loose file holders.



FIG. 123.—Loose file holders.



FIG. 124.—Carrying hook.



FIG. 125.—Adjustable attachment, with pressure connection.



FIG. 126.—Adjustable attachment, with pressure connection.



FIG. 127.—Auger holder.



FIG. 128.—Attachment with biting pressure.



FIG. 129.—Attachment with rubber pressure-grip.



FIG. 130.—Nail (holder) clamp.

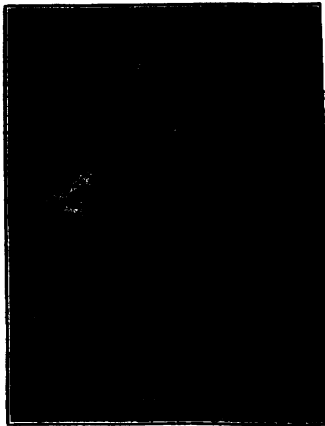


FIG. 131.—Wooden hammer (mallet).



FIG. 132.—Adjustable attachment for scraper.



FIG. 133.—Adjustable attachment for plane.



FIG. 134.—Hand brush.



FIG. 135.—Adjustable attachment, with rubber pressure-grip.

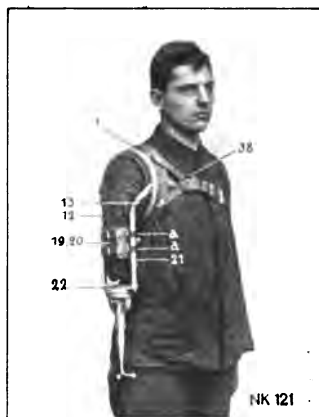


FIG. 136.—Showing adjustment of working arm.



FIG. 137.—Disconnecting lower from upper arm.



FIG. 138.—Shortened ball connection, with rigid file holder.



FIG. 139.—Shortened ball connection, with rubber presser.



FIG. 140.—Shortened ball connection, with loose file holder.



FIG. 141.—Shortened ball connection, with rubber presser.



FIG. 142.—Rivet hammer.



FIG. 143.—Shortened ball connection, with holder for hack saw.



FIG. 144.—Double ball connection, with pressure bowl.



FIG. 145.—Double ball connection, with pressure bowl.

APPENDIX A.

REEDUCATION OF WAR DISABLED.

(Welfare Division.)

A. INFORMATION BLANK FOR THE DISABLED.

Given and Surname.....
Rank and Service.....in troop div.....
Filled out by.....hospital in.....
or completed by.....Troop div.....

The filled out blank serves as a foundation for any and all vocational advice conferences in the hospital, in the troop divisions or at home. Therefore greatest care must be exercised to answer all questions correctly. Wherever the answer is based on surmise it is later to be completed or corrected.

Questions which cannot be answered at the time of the dismissal of the man, are to be left blank for the next conference.

Notice.—In the printed sheet plenty of space has been given for the answers and probable additions.

I. Personal:

1. Given and surname of the injured.
2. Date and place of birth.
3. Last vocation.
4. Troop, rank, reenlisted.

5. Residence, street and number.
 - (a) Before service.
 - (b) Do you expect to remain there.
 - (c) New or future residence.
6. Family circumstances:
 - (a) Single, married, widowed, divorced.
 - (b) Number and age of own children. Any dead.
 - (c) Parents living. Where.
 - (d) Position of father.
 - (e) Number and ages of minor brothers and sisters.
 - (f) Did you live with your parents.
 - (g) Did you formerly contribute to their support.
 - (h) Have you any capital. Revenues, pension or other source of income.

(These questions are to be answered personally and only after reading question III-12b, 13, 14b.)

II. Regarding Illness or Injuries:

1. Date and nature of injuries or illness. Amputations.
2. Hospitals where treated.
3. Medical opinions:
 - (a) Permanently fit for garrison service only.
 - (b) Permanently fit for easy work only.
 - (c) Discharged as entirely unfit.
(In (a), (b), (c) cross out all but the facts.)
 - (d) Any parts missing or greatly diminished in usefulness. Which. To what degree.
 - (e) Does the injured possess artificial limbs. Which.
 - (f) General physical powers and conditions.
 - (g) Condition of mind (discouraged, despondent, hopeful, etc.).
 - (h) Special data.

4. Can the injured through exercise of his limbs and joints help along his future work. And how.

III. Regarding Vocation:

- I. (a) Name of employer or firm and last position.
(b) Passed the journeyman's or master's examination.
(c) Was he a master.
2. Had he been employed in a branch of his profession or in other professions.
3. Highest former wages; monthly, daily.
4. Has he any other preparation or abilities.
5. Intellectual education; common school, etc.
6. Is a continuation in his vocation possible. If not, why not.
7. (a) Does he seem willing to work. Is he ambitious.
(b) What are his prospects, plans or preferences regarding his future. If possible give concise reasons.
(c) Was he accessible for a conference up to the time of his dismissal from the hospital. Compare V, 2.
8. For which kind of work, new or old, does he seem suited. See questions 7, a to c.
9. Are there any prospects or negotiations pending for employment with his former or new employer in his former vocation, a variation thereof or a new calling.
10. (a) What suggestions are being made for the training in his new vocation.
(b) Can you name any instructors.
11. How long will his new training presumably take.
(a) Minimum.
(b) Maximum.

12. (a) What are the wage possibilities in the new profession.
- (b) Are expensive tools necessary. Price.
13. Are the expenses connected with his training or the acquisition of tools placed entirely upon the local Welfare Committee; can the man himself pay part of it, or any other source. To what extent.
14. (a) Can the man maintain himself during his apprenticeship.
- (b) Is his family taken care of.
- (c) Residence of family.

IV. Insurance:

1. Is he insured with the national organization.
- (a) Illness insurance.
- (b) Accident insurance.
- (c) Invalid and life insurance. From which company does he hold receipts. From whom can the company demand the last receipt.
- (d) Employees' insurance. Membership card at hand. From whom can it be called in.

V. Discharge: Excepting V-5 each question must be answered even though the man has been furloughed up to his discharge.

1. When and where discharged or furloughed.
- (a) From the hospital; date.....
to troop.....located at
- (b) From troop division; date.....to
District..... Militia
District.....
2. Was he accessible to a conference when at the troop division. Did he follow the advice. Compare question III, 7c.

3. Has he been given permanent employment.
Where. As what. With whom. Firm or employer.
4. If question V 3 is answered negatively: The injured
has been given the following advice at
the time of dismissal or furlough:
 - (a) In the hospital.
 - (b) At the troop division.
5. Fixing of Pension; by the reserve general command.
Degree of ability to earn a livelihood.....
per cent.
Degree of maiming.....per cent.
Pension.....Mks.....Pf.....
Maiming allowance.....Mks.....
Pf.....
War allowance.....Mks.....Pf.....
Civil care indemnity.....Mks.....
Pf.....
Total per month.....Mks.....Pf.

Furthermore granted:

An employment certificate or civil welfare certificate.

Cross out what does not apply.

Place.—Date of the first information.

Signed by.....

Notice.—All additional information and corrections must be placed under the proper numeral with date and signature.

APPENDIX B.

REEDUCATION OF WAR DISABLED

(A form of circular; illustrated.)

B. A WORD TO OUR SICK AND WOUNDED SOLDIERS.

A Back-to-the-land Argument.

You have fought for your country, you have protected it from invasion and immeasurable devastation. Your country and all classes of the population are firmly resolved to reward you for this and to aid you, so that you may be able to earn something toward your living for yourself and those dependent on you.

Possibly you are not able without further ado to return to your former profession. So the question confronting you is in the first place:

What can I become?

Many possibilities are open to you and your comrades, and it almost seems as if there were a field of activity which like a land of plenty exerts a magnetic influence upon all injured. Positions are open in the postal and railroad service, in offices, porterships, etc. Of course it is impossible to always comply with the wishes of everyone in this direction, inasmuch as the railroad and postal service must first of all provide for their own former employees who may have been wounded. Keep in mind also that there is possibly

many a one who is more seriously injured than you. Leave to him the positions in the offices and rejoice, if you are less restrained in your ability to move about. Possibly also the income in the position which you may contemplate in an office is by far less than it would be if you were to seek a living in the free industrial life.

What is there Left for You to Do? Your hospital is in the city; in an earnest manner efforts are made in your behalf, and opportunities are afforded you to devote your spare time to useful things. Many of your comrades—perhaps you also—are participating in some special training course, in order to add to their education or to prepare themselves for some other calling.

Is it not possible that as a result with you also the idea has gradually developed that you could find in the city only your future livelihood?

And yet there is the country besides the city; and today we want you to ponder on the question whether in the future you will remain in the country, or in case you have already established yourself in the city, whether you cannot return to your former home.

You may put two questions to us: (1) Does my injury permit me to continue work in the country? (2) Where will I do best? In by far the most cases you can work in the country just as well as in the city, or in other words: *If your injury is of such a character that you may consider any sort of labor, then there is nothing in the way of your activity in the country.* Listen to what a one-armed farmer tells us:

“The soldiers who formerly were employed in farming, and who now because of the loss of an arm have become cripples, for the most part assume that they have been rendered unfit for the agricultural calling, inasmuch as they feel that they are no longer able to perform heavy tasks connected with farming for which they believe two sound arms are absolutely necessary. That is not true and my own experi-

ence has verified it. In my twelfth year, through an accident, I lost my right arm. Through a relative, who had also been deprived of his right arm, and who himself was a farmer, I was induced to take up farming. My own inclination was gladly to accept the advice of my relative.

"I have been able to plow, and with a team of oxen have torn up the heaviest and hardest fallow fields. I learned to pitch, to load and unload grain, to load manure, to mow with the scythe, etc. There is no work in farming that I have not learned and performed. I drove a team of four horses from the saddle and sowed whole fields with my hand. Through the strict performance of all the work I grew so accustomed to the loss of my right arm that I did not miss it at all any more. I venture the assertion that it is possible to do everything with one hand."

To be sure, we must in this instance consider the fact that our narrator had lost his arm at the age of twelve, and so he became more easily accustomed to using his remaining member. But the account shows us that with the necessary will-power it is possible to accomplish a great deal.

Study the following illustrations: we did not make a special effort to find the farmers represented there, but came across them accidentally.

The first one is a truck farmer who twenty-two years ago, at the age of forty-three, lost his arm in a factory accident. He received a pension of a little over 40 marks. At the time of his misfortune he had seven small children. He had no money, but with exemplary energy and with indefatigable industry he has since prosecuted the cultivation of fruit and vegetables and has attained a certain prosperity, so that today he is entirely independent. We first met him while he was engaged in carting manure. On various days and for a long time we were enabled to see him at work. There is no garden work that he does not perform. We have also observed him at the work which is most difficult for him—

digging. If he had accustomed himself to an artificial arm, the work would cause him less difficulty. If an invalid of the war is as grievously injured as this man, we would not expect him to devote himself to farming, but some other position would be found for him. But if only the lower arm is lost, or the upper not too far above the elbow, then by means of an artificial member or also by using the stump, the performance of almost every sort of labor is possible after practice. About ten years ago another farmer, on account of an accident while in the army, lost his left leg above the knee. He did not climb up a ladder to show off; we found him in that position. Last fall he picked twelve hundred pounds of plums. All other kinds of work he also performs without special exertion. He carries burdens like any sound man and not only does garden work, but also all field labor requiring the use of teams; he moves about behind the plow or on recently plowed land almost as fast and as safely as any other man. For six years he has held the position of a day laborer on a large estate. When he began wearing the artificial member he could, of course, not work as he can today; and he has repeatedly assured us that the task of becoming accustomed to the adaptation of the artificial member to the thigh was rather inconvenient and at times painful. But it was only a matter of a short time with the aid of an energetic will, that he learned to use the limb. Aside from the fact that a war invalid who has lost his leg above the knee receives by far a greater pension, we would at first attempt to secure some easier occupation for him.

However, in recent times still greater progress and new inventions have been made, so that the performance of every sort of work has been decidedly facilitated by means of artificial limbs.

The work in the country, moreover, is of such great variety that some sort of calling can be obtained for every injured

soldier. There are vegetable and fruit growers, foresters, cattle attendants—work for which at times a young assistant is added, coachmen, assistants, forest laborers and officers for the protection of forests, vineyards and wine-cellar laborers, managers, dairy officials, etc. For those with very serious injuries, especially for those whose movements are greatly limited, positions are suggested such as that of cashiers or managers of rural societies and clubs, as assistants in district and community offices. For such positions only the very seriously wounded are considered.

Finally the country opens up many possibilities in the trades. In numberless villages a saddler may be wanted, a blacksmith, a wheelwright, a tailor or some other tradesman.

In the entire list of occupations mentioned above there is possibly one which will enlist your interest; and for every degree of injury some employment may be secured.

And now our second question: Where can I do best?

If a healthy and vigorous man goes to the city and finds work he may possibly earn more money there than in the country, provided there are no hard times that will deprive him of employment and income and quickly consume his surplus earnings. At any rate we entreat you to look around in the circle of your comrades or other acquaintances, who have moved to the city and have lived there for a long time. Have they saved more than their contemporaries in the country? Have they been able to secure more permanent positions for their children and leave much to them at the time of their death? And even if you know one or the other who is faring well, possibly you will think of three others with whom you would not like to change. Thus there is hardly a perceptible difference between the prosperity of healthy working men and inhabitants of the city and of the country, although the wages are actually higher in the city.

Now, with you the situation assumes an entirely different aspect. A greater part of your future income—pension,

extra pay, etc., is just as high in the country as it is in the city, whereas the expenses are higher in the city. Throughout, the price of foodstuffs is higher, and the same applies to rent. In the country, vegetables and fruit, chickens, fresh eggs, good milk, meat, honey, etc., will be cheaper, for you can produce all of this yourself. All these are things that reduce the expenses of the household. Raising fruit and vegetables, and breeding small animals can be taken up as a side occupation; in many instances, however, you will be able to support your family without this. But if in addition to the mentioned possibilities you have some principal occupation as country laborer or tradesman, even though this does not yield as much money to you as to your comrade in the city, you are still a whole lot better off. Furthermore, you will rarely speak of "hard times" and lack of work.

And now there is another circumstance which Germans at present know how to appreciate most keenly. You and your comrades have in battle regained your German fatherland, you have sacrificed your blood and your sound limbs. And if you now leave your village and move to the city, live with your family in a high and narrow tenement house, and move about from one place to the other—do you then have a share in the fatherland? Can you really call that your home? And if you are already living in the city are you not at times seized with a feeling of homelessness, and do you not recall in quiet hours the fields of your former home, the scenes of play and joy of your youth? Now the opportunity is offered to you to return. We will gladly lend a hand. In the country you have the opportunity of acquiring a home and garden, a piece of your fatherland. You will create for yourself a safe future, for your family a house, for your children a home. In the vicinity of the large towns a few acres of land suffice for the support of your family. If you are acquainted with agricultural work, and if your wife or betrothed is willing and able to assist, there will be ways

and means of securing for you under certain conditions a small farm which you can acquire on favorable terms. If you should be so seriously injured that you are no longer able to perform some of the agricultural tasks, then your pension will be so high that you will be able to hire a young farmhand, or perhaps purchase machinery.

And is there a more independent and free man in the wide provinces of the German fatherland than the free farmer, who remains on his property and need not look either below or above, neither to the right nor to the left?

And now, my friend, reflect and make your choice; and if you wish to obtain more definite information, you may confidently apply to us. We shall gladly and without cost to you give you all information desired. And if you wish to prepare yourself for one or the other occupation we can aid you in taking courses on vegetable growing, beekeeping, breeding of fowls, etc., or on general agricultural subjects and there will be no expense to you.

In concluding we wish to make one request. Do not allow yourself to be imbued by the unfortunately far-spread idea that the aim of our deliberations is to reduce your pension by offering you occupation. Not the size of your income, but the extent of your injury is the deciding factor in determining your pension. The reduction of your pension is so insignificant that it does not come into consideration at all in the face of the indicated opportunities for income. We are guided only by one aim: to safeguard your future and your welfare, and we entertain the firm conviction that only thereby the future and the welfare of your fatherland is served.

C. NATIONAL AND COMMUNAL WAR RELIEF WORK.

Measures for the relief and aid of the families of soldiers have been undertaken by the imperial government and by the various municipalities. The administration and distri-

bution of this aid is conducted by the municipal or local government assisted by volunteer organizations, usually of women.

In accordance with the law of February 28, 1888, enforced on August 4, 1914, communities are obliged to furnish monthly support to the families of participants in the war, in order to protect them against extreme distress. The number of persons entitled to support is limited by law. The communities advance the amounts for the empire. These, at the beginning of the war, amounted to 12 marks per month for the wife and 6 marks for every child under fifteen years. Restitution to the communities by the imperial government is to be made later; the time is determined by a special law. Owing to the long duration of the war there has been a necessity for increasing the aid. The amounts were therefore then fixed at 15 marks for the wife and 7.50 marks for each child, but by a special order have lately been raised to 20 marks for the wife and 10 marks for each child. By various regulations also the number of persons to whom assistance is to be given has been enlarged.

According to a notification of January 21, 1916, the following are now entitled to support for their family members: (a) Troops who are engaged in the execution of their active duty; (b) volunteers; (c) members of the empire who as a result of hostile measures have been prevented from returning or have been carried off by the enemy; (d) parentless grandchildren; (e) step-parents, step-brothers and sisters, step-children; (f) an innocently divorced wife to whom the husband is obliged to pay alimony; (g) illegitimate children of the wife prior to her marriage, even if the husband is not the father; (h) foster-parents and foster-children.

Parentless grandchildren over fifteen years, as well as the persons named under e, g, and h, can claim assistance only in case they were supported, or if the need of support became apparent, after the supporting member had entered military

service. Foster-parents and foster-children are entitled to support only in case the relationship existed before the beginning of the present war and if no indemnity is being paid. The claim is kept in abeyance so long as they are entitled to aid according to other provisions of the law for the support of families or according to this regulation.

Indigence is to be assumed and at least the minimum amount is to be paid, if according to the last tax assessment the income of the one called to the colors and of his family amounts:

In places of the tariff class E to 1000 marks or less.

“ “ “ “ C and D to 1200 marks or less.

“ “ “ “ A and B to 1500 marks or less.

If the actual income of those entitled to aid with reference to the tax assessment is essentially less or greater, or if there is no assessment, the disbursing agency must ascertain it on its own authority. As a rule a claim does not exist if the enlisted soldier together with his family does not suffer any loss in his income, or if other facts justify the assumption that aid is not required.

The work connected with the payments is considerable, as the persons entitled to them collect their allowances every month and every amount must be booked and receipted. This work is performed by the city treasurer in addition to his regular duties.

Raising the means for this support is no small task for the city for, as mentioned above, the empire ordinarily does not refund the amounts until after the conclusion of peace. Owing to the intercession of the German municipal diet the imperial government has consented to refund a part of the expenses for this purpose during the war.

The great losses in human life which the war has demanded have led to measures for the preservation of the coming offspring and to accord indigent women, whose husbands are at the front, aid in confinement. The necessary provisions

were accordingly made by the "Bundesrat." In the first notification this was dependent upon the fact that the husband doing military duty had, prior to his enrollment, been insured against illness within the preceding twelve months for at least twenty-six weeks or immediately before for six weeks. According to the latest announcement, the conditions are (1) that the husband of the confined woman is rendering military, sanitary or similar service; (2) that the confined woman is without sufficient means, *i. e.*, that she receives support from the empire. Her means are even then considered insufficient if her own and her husband's total income in the year or the fiscal year prior to his enlistment has not exceeded 2500 marks or if her total income after his enlistment at the most amounts to 1500 marks and for every child below fifteen years to 200 marks. This aid is also rendered under certain conditions in the case of the birth of an illegitimate child of a participant in the war.

For this aid is allowed (1) a total contribution of 25 marks toward the expenses connected with childbirth, (2) an allowance of one mark per day, inclusive of Sundays and holidays, for eight weeks, of which at least six must be after the confinement; (3) aid with a maximum of eight weeks for the services of a midwife and medical treatment, in case any complications of pregnancy require it; (4) for nursing mothers, a nursing fee of half a mark a day, inclusive of Sundays and holidays, until the end of the twelfth week after confinement. If the nursing mother carries any sick benefit insurance, she must apply for aid to this fund, otherwise to the disbursing agency.

At the outbreak of the war, a welfare station (Fuersorgestelle) was created under the direction of the municipal officials for the families of soldiers, under the name of "The General Aid for Families." This welfare station was to decide as to applications which were made by families of soldiers who needed more than the legal allowance. The

amounts granted by the imperial laws are only minimum amounts; the obligation of the community to grant additional support in case of necessity is not affected by them. The personnel of The General Aid for Families is composed chiefly of the women's volunteer welfare societies, such as the National League of Women (*Vaterländische Frauenverein*) and a League for Women's Service created since the war as a center for the social and economic tasks in each municipality.

For the administration of the General Aid for Families the city is districted and a chairman assigned to each district; these chairmen with members of the city council constitute a committee of management. Because of the fact that this work has been assumed by women of the educated classes it has been possible to create an intermediary for those women who are entitled to war aid. The wives of soldiers can confidentially apply to the chairman in their districts and are not always compelled to apply to the board. The coöperation of the women's societies has also been a great saving to the city, as the work of investigating requests for aid and the clerical work would have involved heavy financial expense.

In the amounts paid by the General Aid for Families are included especially costs of medicines and medical treatment and rentals for soldiers' families. In the first months of the war the physicians kindly offered gratuitous treatment for these families. Owing to the duration of the war it was not possible to see this through. An agreement was therefore made by the doctors that they would give treatment on a certificate of the board of directors of the General Aid for Families, for which they were to be compensated by the city councils according to the minimum amounts of medical fees allowed. The compensation for every day call is 1.50 marks, for a night call 4 marks, for office consultation 1 mark. In the same manner the costs of drugs are returned. The druggist charges up the amounts for the poor with a rebate of 10 per cent. As a result of these regulations the medical

care of soldiers' families has been sufficiently guarded. In a number of cases members of such families have been admitted into the city hospitals or treated by specialists. Tubercular cases are also taken care of. In order to preserve the advantages of the sick benefit insurance for the families of the enlisted men the payment of the premiums has also been undertaken in many cases by the General Aid.

The question of the payment of rentals for soldiers' families has had to be regulated. In general it is expected that the wife of a soldier pay a certain part of the rent from her own means. In many places the city has undertaken to make good whatever deficit there may be. This liberal treatment of the landlords has been made possible only by the fact that the cities are reimbursed for this outlay by the Prussian State and the imperial government. The matter of rentals comes under a special department of the Aid for Families and one of its duties is to supply information in regard to available small houses suitable for soldiers' families. By a special notice owners of such houses are requested to advise the city council in case houses are vacated.

To facilitate an accurate control of all cases requiring support a record of all is made. For this purpose a special question blank has been prepared stating all the facts concerning the personnel and financial circumstances of the families of soldiers. These are kept on file at the city hall and are constantly kept up to date.

Another measure of the different municipalities for the aid of soldiers' wives has been the establishment of sewing shops or the giving out of sewing to be taken home. A large part of this work consists in the repair and cleaning of uniforms; hospital supplies and clothing for prisoners are also made in these shops. The working hours are fixed at 7 to 11 A.M. and 2 to 6 P.M., in order to give the women an opportunity to provide the meals for their families. The wages are paid by the garrisons and average 2.50 marks per day.

With the coöperation of the women's societies war kitchens are established. There is also a bureau of nutrition which concerns itself with the securing of foodstuffs for each municipality and the sale of them at cost at the city sales shop.

D. THE SOCIAL HEALTH INSURANCE AND HOSPITAL SYSTEMS IN PEACE.

A striking feature in Germany is that for the past three or four decades the known facts of health have been utilized for the benefit of the whole people. Health, vocation and recreation have become watchwords and through medical science and the research habit in all directions have come whatever advantages, social, financial and military, the German people may possess.

During this period, it is claimed, the average length of life has been increased about one-fourth. Through the various public and private health and social insurance organizations each home has been reached, morbidity has been decreased, infant mortality reduced and a far greater percentage of each generation reaches the beginning of productive life at seventeen than in other countries. Hospitals and insurance organizations are so connected up with the lives of their patients and members, before and after, in a system of investigation and follow-up treatment that a knowledge of hygiene, or how to avoid disease and how to live is widespread. Health has become one of the great national assets and it is to this that a great measure of the strength of Germany is due.

This health investment should not be regarded as an example of so-called German efficiency; it would be merely surprising if they should not have acquired health, the greatest boon on earth, by the expenditure of a little time and money, especially when it can be demonstrated that each dollar invested returns \$1000 in profit. There is nothing miraculous, as some would make it appear, about German efficiency in

any direction; once they are convinced, by those competent to judge, of the value of any measure, they simply adopt it.

Compulsory social insurance as a factor in general health, and especially the insurance against sickness, invalidism and accidents, has enormously increased the demand for hospitals. The funds of the three principal insurance companies had so increased that they could pay hospital charges for their members without difficulty; there was even a surplus which was loaned at 4 per cent. for building homes up to 80 per cent. of their valuation. Formerly, people who were only slightly ill never thought of going to a hospital, but now the insurance companies and the employers send these patients to the hospital for observation and the patients themselves are usually very anxious to go.

The government contributes heavily to the organization known as the "Krankenkasse," in which working people with a certain income are obliged by law to be insured against acute illness lasting from six to twelve months, also to the "Versicherungsanstalt," in which people are insured against permanent illness, invalidism and senility. The complete titles of the latter are "Landesversicherungsanstalt" and "Versicherung gegen Alter und Invalidität." Besides these organizations, working people are insured against industrial accidents in the "Berufsgenossenschaften," which are semi-private companies.

A statistical recapitulation of the expenditure for workmen's insurance in Germany for the year 1914 was issued by the general commission of the trade unions of that country.

According to this statement 14,500,000 persons were insured against sickness, 26,000,000 against accident and 16,000,000 to 18,000,000 against permanent disability.

There were 6,249,527 persons who suffered from sickness causing disability, 139,633 accident cases were settled by single payments and 1,010,495 persons received continuous periodical payments for accidental injuries.

In the permanent disability and dependent classes there were 192,573 persons injured, 1,102,159 persons drew continuous periodical payments and 8542 persons received single payments.

The settled claims amounted to 429,617,806 marks for sickness insurance, 175,350,766 marks for accident insurance and 217,926,303 marks for permanent disability and dependents' insurance; a total of 822,894,875 marks.

The contributions were: 445,251,076 marks by premiums received from the insured, 498,835,617 marks by premiums received from the employers, and 58,115,992 marks by government grants.

From the foundation of industrial insurance in 1885 until 1913 the following payments for compensation have been made to insured persons: Sickness insurance, 5,567,333,049 marks; accident insurance, 2,478,778,635 marks, and permanent disability 2,693,778,413 marks; a total of 10,739,890,097 marks. Toward the cost of the workmen's insurance were contributed: By the insured, 5,895,223,670 marks; by the employers, 6,661,551,737 marks, and by the government, 816,035,462 marks; a total of 13,372,810,869 marks.

If an exhibit were made to show the causes of Germany's ability to continue the war, her remarkable system of industrial compensation, designed to insure the well-being of the working classes, would have a foremost place.

The German peace hospitals and social insurance companies are the principal agents in assuring a high standard of health for the people and the hospital in its relation to State and other insurance laws has greatly increased the demand for hospital care. From 1877 to 1910 Prussian hospitals increased from 888 to 2314, or 300 per cent.; the number of hospital beds in the same period increased from 37,000 to 161,000, or 400 per cent.; the number of hospital patients from 211,000 to 1,400,000, or over 700 per cent. In 1887 there were 142 beds to each 10,000 people and only 81 per-

sons in the 10,000 were treated in hospitals; in 1910 there were 405 beds and 330 persons in 10,000 received hospital care. From 1910 to the beginning of war the increase was proportional and complaints were universal of the lack of beds, wherever the population is obliged by law to participate in industrial insurance. The average in America is 70 beds per 10,000. Only seven years ago experts declared five beds necessary for each 1000 inhabitants in United States cities of more than 100,000 and more for industrial populations, but where the population is obliged by law to participate in industrial insurance the need and the demand for beds is very much greater.

The Prussian law makes a distinction between public and private hospitals. Public hospitals are maintained by corporations and establishments specified by legislation and the private by individuals or organizations. To the former belong those maintained by the Empire, the federated States of the provinces of Prussia, the other large States, the country districts and towns and also by the *Krankenkassen*, *Versicherungsanstalten* and *Berufsgenossenschaften*. The Empire is the owner of all hospitals in the colonies and the Prussian States control the university hospitals, or clinics and military hospitals. Provinces own the lunatic asylums and midwifery schools. District or country boroughs have many smaller hospitals of their own and the towns especially own small and large hospitals. With the development of industry and trade and increase of wealth a more complete care of the sick followed and the striking results due to medical organization in hospitals increased the demand for hospital care which was met by insurance so that now the supply of beds cannot keep pace with the demand. The sound judgment of magistrates in interpreting the laws has been a big factor in success of hospitals. Numerous hospitals belong to boards of insurance which receive only those persons who are members of their respective institutions. Some

hospitals belong to charity organizations of a clerical character. There are also private hospitals with commercial interests. The essential and practical difference between these two kinds of hospitals is the requirement from the private one of a concession from the government. Before such concession is granted the promoter is examined concerning his capability of managing a hospital. The public hospital does not need this concession but all are governed by rules enacted by legislation concerning building, furnishing and management; the conditions are exacting and are strictly maintained. There is, nevertheless, great freedom and no monopoly exists; the State has only reserved the right to inspect the hospitals.

Social insurance managements very often use the hospitals to determine whether a patient is really incapable of earning a living and in some State hospitals (city) half of the patients are there only to be examined carefully. Under the present clinical organization of staffs the result is a very lively change in the supposed condition of many of the patients.

The German hospital aims to educate the patient how to lead a proper life so that the home will profit by the example.

In many cases these institutions have become an index of increased financial, practical and artistic power. As in olden times cathedrals were erected as monuments of culture and as memorials for the future, today wealthy cities erect with the same idea their beautiful and expensive hospitals; extra architectural expense is voluntary and of course could be avoided.

The cost is increasing; all have to pay; if unable and they are insured, their company pays; if not insured, the home town or district pays; a two-years' residence acquires the right to have the town pay; charity beds are very few. The government, the courts and the army can send patients to hospitals but must pay for them. Most patients go into the

third class at 50 cents to \$1 per day; first and second classes are about 75 cents to \$3 per day and up. The income does not usually meet the expenses and they get help from the public treasury. X-rays and very expensive items are extra.

Some hospitals require only a few cents a day; in the higher class hospitals a physician's fee is extra. It is not customary to make regular charity gifts to hospitals, the sums received are small.

Since 1911 a method to reduce expenses is in operation; there are usually many patients who do not need the complicated and expensive arrangements required for persons seriously ill; these are sent to smaller establishments sometimes in the country, especially convalescents, chronics, anemics, rheumatics, etc., go to the more home-like hospitals.

The city hospital is usually a general one; there are few special hospitals for infective cases; infectious cases are sent at once to a special separate pavilion for the purpose; every hospital has rooms for the detention under observation of suspicious cases.

The government regulation of hospitals follows closely the progress of medical and hygienic science; regulations are very strict and advanced especially since 1911. The hospital system is still in the process of evolution.

To be received in a hospital in Germany is no longer considered an act of charity. It is thought advisable now to have the sanitary conditions of the district under the hospitals.

A very interesting statement concerning an improvement in the general health of the German people since the war came from Geheimrat Heynacher, health officer for a country district containing 80,000 people. He had observed a decrease of about 50 per cent. in all diseases among the people and believed that it was due to a restricted diet, less alcohol, more regular hours and the continuous wholesome exercise of daily work. During a conference with the chief surgeon of the army, Excellenz von Schjerning, in

February, 1917, he confirmed this statement as applying to the whole country.

Aside from the question of the irreconcilable differences between autocracy and democracy, if we will look back of the phenomenon of the tremendous power of Germany we can see the great fact of community life organized for health both for peace and for war. If we overlook this and fail to learn this great lesson from the enemy and allow our genius for organization to continue in the orbit of private interest, and too often contrary to the public good, we will have missed one of the most valuable lessons of the great conflict and something which naturally belongs to a democratic form of government.

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